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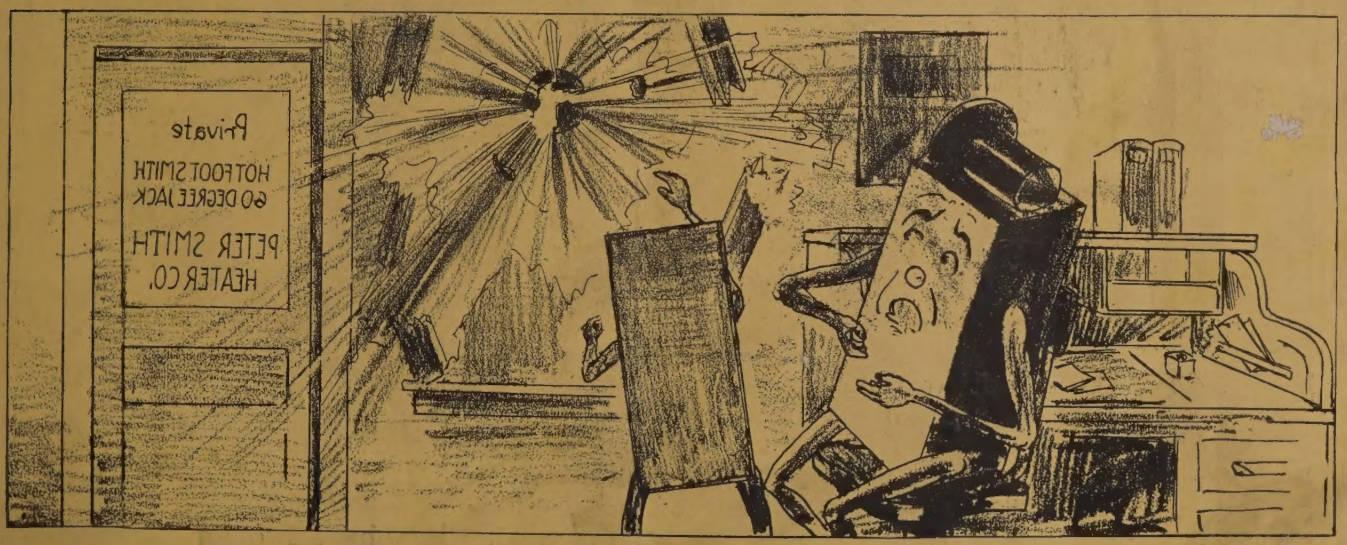

He Was Not an Instant Too Soon

The Plotters Foiled—Hotfoot Goes to the Convention

We must now digress somewhat. When Hotfoot Smith left the courtroom he was not accompanied by 60-Degree Jack. There was a reason. Ever alert for the welfare of his co-worker, 60-Degree Jack had overheard a conversation which set every fibre in his body into action.

"A plot against Hotfoot, as I live!" he exclaimed. "Another attempt on his life. Well, we'll see what we shall see!" And with clenched fists, and eyes flashing fire, he trailed Freezemup straining his ears to catch the details.

Suddenly his face blanched and his heart stood still.

"Infernal machine—package—Hotfoot Smith—No convention for him—Ha, ha," he heard.

The whole plot in all its cunning and cold-bloodedness flashed across his mind in an instant. Chagrined at the verdict in favor of Hotfoot Smith and the invitation he had received to attend the convention, Freezemup was determined he should not go and had sent him an infernal machine.

"Great Heavens!" gasped Jack. "It may even now be too late." And with lightning speed he dashed madly down the street in a wild race to warn his co-worker. In his excitement he didn't think of the telephone.

Breathless and almost exhausted he arrived in the very nick of time. Hotfoot had just cut the string.

With a bound 60-Degree Jack leaped across the room and swept the package from Hotfoot's hand straight through a window.

He was not an instant too soon! For with a deafening roar and a detonation that shattered the window frame the bomb exploded as it hurtled through the air. But Hotfoot's life was saved. The plot had failed and in spite of his enemies he will be seen at the Chicago Convention.

It is now Hotfoot's inning and there will be no failure.

(Continued next week.)

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Ask for circular and blue prints showing installation.

The Peter Smith Heater Co., 88 Isabella St., Detroit, Mich.

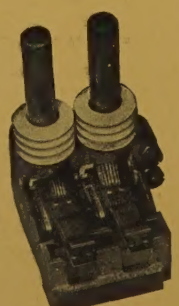
Chicago!

"BOSS," said Joe the master mechanic to the general manager, "I would like to take our general foreman, Sam, with me to the convention. That's where I first saw the Westinghouse HL control, and their light-weight motor. You know that our service since last winter with these equipments has put us in right with the people of this burg. The Westinghouse Exhibit, alone, was worth the trip last year. I understand that they have brought out a ***field control type motor***, which effects a great saving in power consumption, and it must be O. K., because it has been adopted by such roads as the Public Service Railway Co., Pacific Electric Co., Michigan United Traction Co., Indianapolis Terminal Traction Co., and the New York State Railways. A demonstrating equipment has been operating in New York City for over a year, and the big Pennsylvania Electric Locomotives have this arrangement, and when you get right down to brass tacks, there is surely some class to that Pennsylvania equipment."

"Take Sam along, Joe," said the general manager, "I think the experience he will get on the trip will benefit the company."

Bearing with Separate Oil Chamber

Westinghouse No. 306 Ry. Motor.



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Electric Railway Journal

A CONSOLIDATION OF STREET RAILWAY JOURNAL AND ELECTRIC RAILWAY REVIEW

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SERVICE WHEN IT IS WANTED

The study of types of rolling stock which has been inspired by the recent experiments with double-deck cars and the widespread adoption of the prepayment principle is a development which encourages the intensive investigation of traffic and service conditions that is needed so greatly on many lines. No well-managed company introduces a type of car that is a radical departure from existing standards until its operating officials decide carefully what particular line is best adapted to the experiment and what part of the public served is most likely to accept the innovation as a desirable one. This has been true of the classes of prepayment cars, and the same policy will be followed where double-deck cars are placed in regular service. One other consideration that should be kept in mind, however, is just as important a factor in the traffic development of a company that is not adding to its equipment as it is with a company that is about to introduce new cars of modern design to replace old types. This consideration is the result on headway, and hence the result on volume of traffic, of such changes in the distribution of cars among different parts of the system as affect the seating or carrying capacity of each unit of service on any one line. A saving in conducting transportation costs that results from the introduction of a car of larger seating capacity is not a real economy if it alters the headway so seriously as to cause a decrease in the volume of short-haul riding that more than overcomes the apparent reduction in expense. This may easily be the effect of extreme lengthening of the headway on certain lines where the conditions are such as to recommend the constant maintenance of a service appealing to short-haul riders. On the other hand, when we consider the severe limitations of trackage on, for instance, Broadway, Manhattan, it is apparent that the company is forced to anticipate a probable constant increase in density of traffic and that, with the present transit situation, it cannot change headways materially without loss of short-haul business. A car with maximum seating capacity gives the most valuable service to the company with limited trackage in the congested district when it is operated during the rush period. Every line in a city system, however, should be subject to almost continuous analysis in order, not only that the riding capacity may be at its maximum when the demand for transportation reaches that point, but that the headway may be kept profitable and at a frequency and regularity that most nearly meet the wishes of the public in each district.

MAXIMUM PROTECTION IN CARHOUSES

The constant improvement in the design and construction of carhouses does not offer much support to those who contend that it is useless to shelter an electric car because it spends so much of its life in the open anyway. Possibly, the merest shed may be good enough for a steam trail coach, but in northern climes something better than that is required to minimize the depreciation of a motor car with its expensive equipment and finer exterior finish. What is open to debate, however, is the question whether the good

intentions of carhouse designers are generally realized in practice. Misgivings on this point are readily suggested by the way in which the heating and fire protection systems sometimes work out. It is not difficult to determine the capacity of the boiler plant and the number of distributing centers which theory indicates as correct for heating a building of given cubical content and construction, but theory makes no allowance for sticky carhouse doors or the failure of depot men to close them promptly. This trouble with doors also reacts injuriously upon the fire protection system if reliance has been placed upon wet valve instead of dry valve sprinklers. Due weight to these important questions of making the heating and fire protection equipments effective in reality was evidently given in the design of the Cranston carhouse of the Rhode Island Company, which is described elsewhere in this issue. The simple expedient of setting back the doors for one-fourth of the depth of the structure has made it possible to handle two lay-over cars on each track without necessitating that frequent opening of doors which makes heating and wet-valve systems a mockery. A similar scheme has been in use for several years at the Sixty-fifth Street carhouse of the Third Avenue Railway, New York, and also at the Park Terminal carhouse of the United Railways & Electric Company, of Baltimore. An additional fire precaution in the case of the Cranston installation is the provision of an underground reinforced-concrete reservoir as a substitute for the tank usually employed as a secondary source of water supply.

SNOW PREVENTION AND REMOVAL

These first raw days of autumn lend seasonable interest to the helpful paper on "Handling Traffic in Winter" by Charles J. Jones, which was presented before the Illinois Electric Railway Association on Sept. 20 and is printed elsewhere in this issue. Mr. Jones has done more than to catalog the list of snow-fighting machinery, from the modest track scraper to the imposing rotary plow; he has also shown how the accumulation of snow may be minimized and how the men who handle the equipment should be organized for prompt and effective action. Snow fences, which were first developed by steam railroads, naturally cannot escape mention in any reference to means of preventing the accumulation of snow on cross-country lines; but now the happy suggestion is made that the same end could be obtained by planting hedges of hardy growth and keeping them trimmed to fence height. The idea that the generating forces of Nature should be used to offset her destructive ones is of both practical and sentimental interest. Perhaps the main disadvantage would be the absence of protection during the first years before the hedge had attained the proper height, but otherwise the natural corral would be an effective snow guard in winter and an ornament to the right-of-way in summer. Furthermore, should such hedges be built for considerable lengths it might be necessary to devise a more economical means of trimming them than is afforded by hand shears. In discussing the organization for snow fighting, Mr. Jones has indicated the desirability of having certain men permanently assigned for this work and of arousing in them the same daring spirit which animates the city fireman. The prompt answer of these men to the call of duty is the most important factor in handling a snowstorm, but reliance should not be placed upon their voluntary appearance because so many storms begin during the night when the men are at home. Every carhouse should post the names and addresses of all of these men, and where possible add the nearest telephone address. The alarm could then be sent out by the night foreman with the very first signs of snow. It is usually recognized that this service demands the best men and that they are entitled to extra pay for the snow-fighting period, but it would also be wise and humane to make arrangements with restaurants or other places along the route whereby the men can be supplied with hot coffee and food without loss of time when they are engaged in their arduous duties.

PREPARATIONS FOR THE CONVENTION

Advance copies of the paper and reports to be presented at the sessions at Chicago are being sent out this week by the secretary's office and indicate a wealth of material for consideration during the sessions. They bear ample proof that the committees of the different associations have put in a great deal of hard and conscientious work during the year which has nearly passed since the last convention, and it is not too much to say that the condition of the industry will be improved as a result of these labors. We do not intend here to discuss any of these reports individually or in detail. This may be attempted later. One notable feature, however, will impress every delegate and member company which receives these reports, and that is the increased number of subjects which have been taken up by joint committees representing two associations. Of course, this is as it should be. A joint consideration of any subject which relates to the phases of the industry represented by two associations is sure to bring out much more valuable information than if it was considered by one association alone. Indeed, it is possible to conceive that one association, arguing from its standpoint only, might reach conclusions entirely opposite from those deduced when the subject is considered in the broader way. This year the number of joint meetings, as well as of joint reports, is larger than at any previous convention, and all four of the affiliated associations have one or more topics which are being considered in this way.

The arrangements for the different sessions, as published in the program which appeared in these columns recently, are as in previous years; that is to say, the sessions of the affiliated associations except on the first day are in the mornings and those of the American Association in the afternoons. This prevents any possibility of conflict or division of interest. All who attend the convention this year should remember in this connection that every one of the sessions of the American Electric Railway Association, or the parent association, is open to all. There are to be no executive sessions; every one in attendance at the convention is welcome to attend any meeting, whether he is an official of a railway company, a supplyman or a guest. This general invitation should result in a large attendance, and this is what the officers of the association are anxious to have.

The program for the American convention is published this week and the subjects to be discussed and the names of the speakers who are to consider them are guarantees of three very instructive sessions. A number of these topics relate directly to the affairs of the association itself, but a much larger number concern the progress of the industry as a whole, and each session promises to contain material of such value as to warrant not only the attendance but the closest attention on the part of every executive officer who will be able to go to Chicago.

The fact that the convention hall is some distance from the center of the city should not interfere in any way with full attendance at both morning and afternoon sessions. We have already stated that ample lunching facilities are to be provided at the Stock Yards Inn. This hotel adjoins the meeting hall, and special provision will be made there for supplying the needs of all in attendance so far as a midday lunch is concerned. This will avoid, of course, the necessity of returning to any hotel near the center of the city for lunch.

THE PEAK LOAD PROBLEM

One of the questions uppermost in the mind of the electric railway manager is the ever present and always irritating problem of dealing economically with the peak load. The present tendency, especially in large systems, is to work from the most efficient plant of turbo-generators possible, to depend on overload capacity and the forcing of the boilers to the peak, and on the underload economy for saving the day at normal loads. The turbine has rather extraordinary capacity for nearly uniform economy over a considerable range of load, and in very big plants where added units can be cut in as required and the total load factor thus kept high there is little doubt that this process is a pretty efficient way of keeping down the peak difficulty. There are cases, however, and not a few of them, in which the peak is of great severity, and it is no small matter to have to keep at hand a sufficient equipment of costly high-efficiency machinery to carry the ultimate load. The question has many times been asked whether it might not pay to provide for the short hours of heaviest peak an auxiliary equipment in which efficiency is sacrificed for low cost, so as to throw the main bulk of the load on the highly efficient and expensive plant, thereby keeping it working at a high load factor and smashing through the peak with the help of the relatively inefficient but cheap plant. This plan would put a lighter burden of fixed charges on the cost of power generation yet would provide an efficient equipment during the hours of light load.

At first thought the proposition looks rather attractive. It seems wasteful to generate power for a few hours per day in a plant of high cost where the fuel item with improved apparatus has gradually become less and less in proportion to the total charges against the power generated. Were it merely a question of efficiency in the generating units a rather plausible argument might be worked up in favor of a cheap plant to bear the brunt of the peak and of allowing the highly organized and costly plant of the highest possible efficiency to work under the most favorable conditions. But there arises in modern practice a consideration which throws some new light on this proposition. The modern turbine, especially if arranged to produce heavy overloads at some loss of efficiency in lessened expansion, is capable of standing up under extremely heavy loads, and so is its running mate, the modern generator. The brunt of the burden falls upon the boilers, and here is where lies perhaps the greatest difficulty.

In the plan of using the cheap plant for overload, when the total boiler capacity as well as the total generating capacity is taken into consideration, the costs begin to shift somewhat. There is no doubt that there is immense opportunity for improvement in boiler practice, either in the use of very big units so far as actual size is concerned or in highly intensive use of units of more modern size. At forced draft the steam output of a first-class boiler can be increased to a point quite beyond the belief of the conservative engineer of the last generation, or for that matter of the present generation. It is done successfully in battleship and torpedo boat practice. It can be done successfully in central station practice. In this way the steam output, under forced draft and at some though not great loss of efficiency can be pushed high enough to respond to the utmost calls on the generating unit.

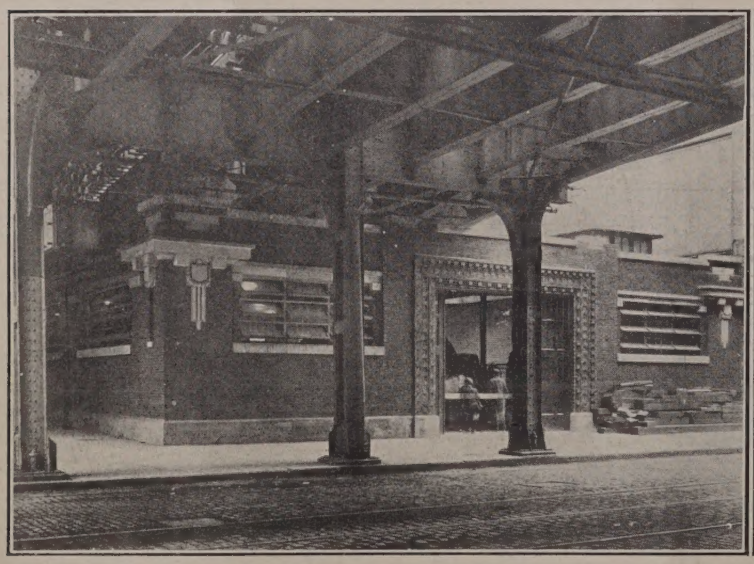
The weakest point in this arrangement, in ordinary practice, is the generator itself, since ratings have of late increased and overload capacity has diminished. But even here may it not be practicable to work even the generators at much higher output than usual for a brief period by the use of extreme measures in the way of forced draft, losing efficiency, not in the heating of the generator conductors, but rather in the power necessary to carry off the heat from them at the utmost possible rate? We do not believe that the limit has been played on forced ventilation of generators. It might even prove possible to use compressors and an air tank during the periods of lighter load so as to force through the generators in time of need a cold blast of rapidly expanding air that would push their possible output without over-heating considerably beyond any limit yet reached. In this way energy stored during the hours of lighter load could be used as an adjunct in pushing the output to the extreme limit when necessary. Where one desires to obtain the advantage of a single station and concentrated generating equipment it seems likely that output thus forced would be as cheaply obtained as in running a separate generating equipment of relatively low efficiency and cost, necessitating in itself extra boiler capacity of no small amount. In matters of real estate occupied and of labor cost the advantage would also be in favor of the single station with forced output.

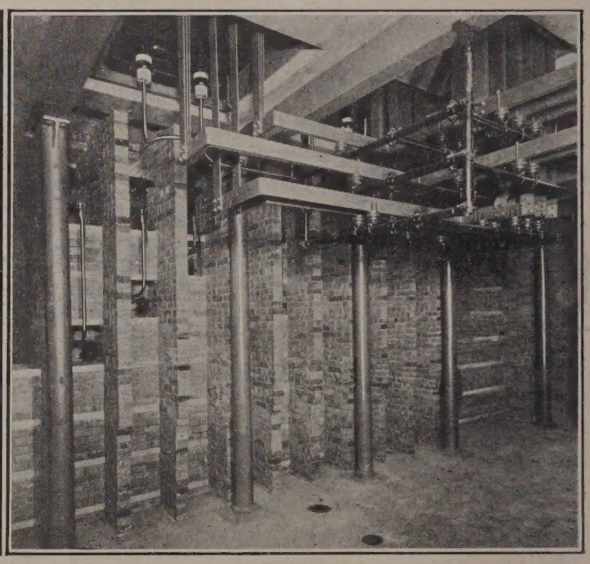
The question as between extra cost of unusual output obtained by these two methods deserves very careful consideration, which it has not yet received. Data are at hand for the fixed charges against cheap stations and for their cost of operation. One can make a fairly good estimate, for example, as to what 1000 kw for two hours per day would cost on this basis. The information, however, as to the cost of 1000 kw of forced output over and above the station capacity ordinarily obtainable at or near the highest point of efficiency is as yet very meager. It is well worth while to a progressive engineer to obtain it as a guide to his future practice.

Franklin Street Substation of the Metropolitan West Side Elevated Railway

A Modern 6000-kw Fireproof Substation with Restricted Headroom, Tubular Conductors on the A. C. Side of the Rotaries and Novel Transformer Ventilating Equipment

The Metropolitan West Side Elevated Railway Company has recently completed a 6000-kw substation to take over that portion of the "Union Loop" load which it has been necessary to purchase from the Chicago Railways Company. Alternating current at 9000 volts will be supplied to this station from the Commonwealth Edison Company's underground distribution system. The total "Loop" load reaches a winter peak of 8000 kw, three-fourths of which is carried by the "Loop" generating station, while the remaining one-fourth, or 2000 kw, has hitherto been supplied by the Chicago Railways Company. Novel features of the installation include the erection of the substation under the elevated structure, which made it possible to locate the station near the "Loop," although the restricted headroom forbade a crane, the employment of tubular conductors on the alternating-current side of the rotaries and the use of transformers with inherent instead of external reactance.





Franklin Street Substation—Front of Building Under Elevated Railway and High-Tension Bus Structure

BUILDING CONSTRUCTION

The substation building was erected on Franklin Street under the elevated structure which leads to the stub terminal used jointly by the Aurora, Elgin & Chicago Railway and the Metropolitan West Side Elevated Railroad, facing Fifth Avenue one block east of Franklin Street. The elevated railway carries four tracks and two passenger shelters at the rear of the substation building, which makes its width exceed 60 ft., and 38 ft. on Franklin Street, where the four tracks lead to a double track.

The substation building contains a main floor and basement 67 ft. 2 in. x 61 ft. 8 in. in plan. In order that all the available headroom should be used and drainage provided at the same time the roof slope is in one direction with a fall of 2 ft. 6 in. in 61 ft. 8 in., making an average clear headroom inside the building of approximately 15 ft. The basement headroom is 9 ft. 6 in. in the clear.

Massive concrete foundations, except under the rear wall, which is temporary, support the brick building walls and rotary foundations. The building foundations are 18 in. thick and rest on 42-in. footings. The temporary wall at the rear of the station was built of brick 12 in. thick from the basement floor level to the roof, so that it could easily be torn out when a larger building is required. Two parallel walls extend practically the full length of the building from the rotary foundations. These walls are 2 ft. 6 in. thick, rest on footings 5 ft. wide and were constructed on 10-ft. 4-in. centers. The floor of the pit is at the same elevation as the basement floor, furnishing ample headroom under the rotaries and the a.c. and d.c. leads from the transformers to the rotaries and switchboard. The rotary supports over the pit consist of two 15-in., 42-lb. I-beams, reinforced by a concrete casing 30 in. x 30 in. in section.

The building walls are 13 in. thick and were constructed with dark-red tapestry brick on the outside and a white glazed brick on the inside of the building. All coping and trim around the doors and windows are made of gray Bedford stone. By extending the Franklin Street wall 2 ft. above the roof at the center line of the building a uniform height was obtained, giving a more pleasing effect architecturally than if it had been sloped with the roof pitch as is the case in the rear wall. A 4-in. reinforced concrete roof slab supported on 12-in. I-beams spaced at 5-ft. 6-in. intervals and covered with a three-ply tar and gravel coating was included in the building design.

The floor system includes an 8-in. reinforced concrete slab supported on 12-in., 31.5-lb. I-beams spaced at 3-ft. 6-in. and 4-ft. 6-in. intervals, with additional beams installed under the transformers, oil switches and switchboard. In designing the floor reinforcing and supporting beams the fact that repair parts could not be handled by an overhead crane but would have to be removed and rolled or trucked out of the building was taken into consideration. As noted, this resulted in the use of exceptionally heavy beams and reinforcing bars. Access to the basement from the ground-floor level at the corner of Franklin Street and the alley is furnished by a structural steel stairway with cast-iron treads.

Daylight illumination has been supplied through seven

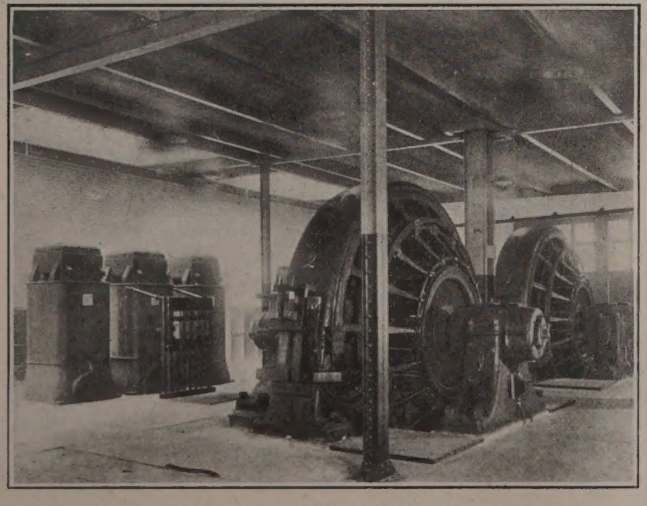
large window openings and skylights over the transformers, which are in that portion of the building extending beyond the elevated structure. Artificial illumination for both the basement and the main floor is supplied by five-light clusters taking current from the d.c. side of the rotaries. In case of a shut-down an independent source of current may be utilized by cutting the lighting circuits in on the Metropolitan West Side feeders. Substation ventilation is supplied through the windows and skylight. The windows are built with three metal sashes pivoted horizontally and operated in sets by a transom lift. The vertical sashes in the monitor skylight are also pivoted horizontally and operated by transom lifts. The opening on the Franklin Street side of the station is closed by two partially glazed sliding doors, one of which contains a small door opening which may be used in bad weather. The rear door is of the corrugated steel rolling type.

GENERAL INTERIOR ARRANGEMENT

In general the station arrangement was governed by the limited headroom in the station, which eliminated the possibility of a crane installation. The engineers did not permit economy in copper to interfere with the convenience of the station, but provided ample space around the electrical apparatus for the operators. Sufficient distance was allowed between the rotaries and the switchboard to permit an armature to be withdrawn from the rotary and rolled out of the building. The rotary foundation is designed to permit the 2000-kw rotary converters to be replaced with 4000-kw units, and the door openings are of sufficient dimensions to permit the largest rotary to clear. Any piece of apparatus may be removed without disturbing any other.

In locating the electrical equipment on the floor, the circuits to the source of energy supply and to the d.c. outgoing cables, the amount of copper necessary to make connections was taken into consideration by making the connections as direct as possible.

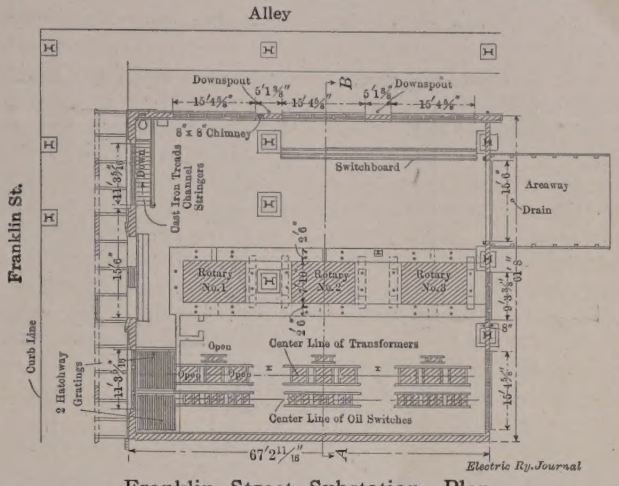
Two three-phase, 9000-volt a.c. lines lead into the basement of the building from Franklin Street through 3½-in. vitrified clay ducts laid up in concrete. A third duct and the bus structure have been provided for future requirements. The a.c. line leads from the ducts through a bell where it is split, each phase being carried through a dis-



Franklin Street Substation—Rotary Converters and Transformers

connecting switch in a separate brick compartment. It then passes through copper tube conductors of 250,000 circ. mil equivalent to series transformers which are connected to the a.c. panels on the switchboard. The series transformers are connected through secondaries to overload relays which automatically operate the oil switches through inverse line relays.

The 9000-volt a.c. line passes from the series transformers through the substation floor to the type H-3 automatic oil switches, thence through a set of disconnecting switches to the machine bus and then through another set of disconnecting switches to two series transformers, one for the watt-hour meters and the other for the overload relays on the rotary. After passing from these series transformers



Franklin Street Substation—Plan

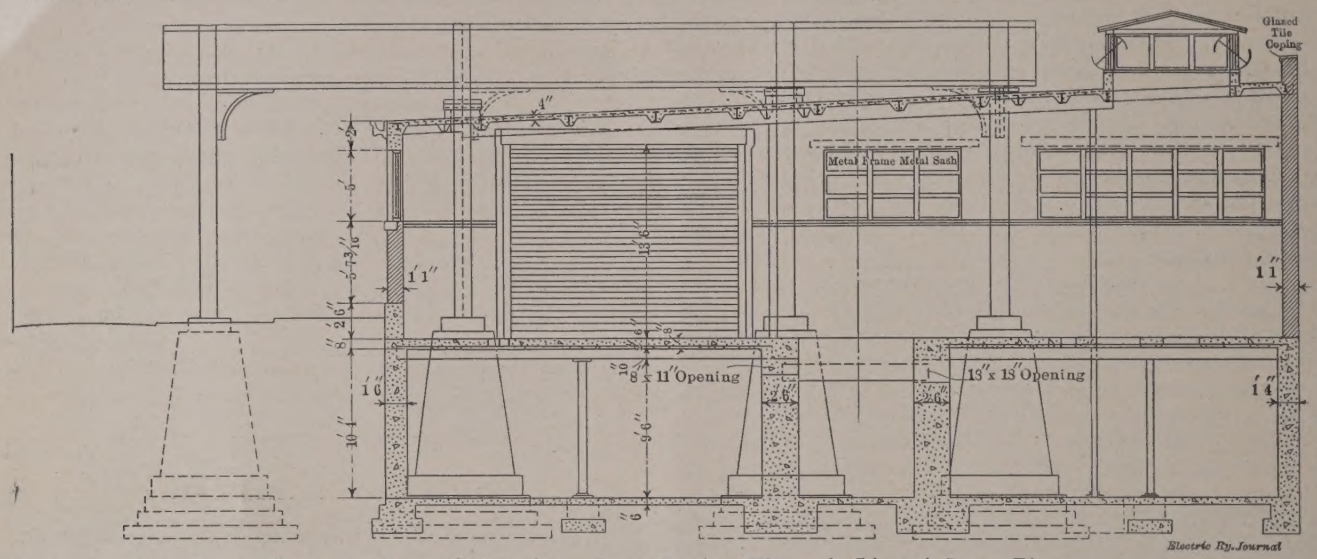
the a.c. line leads to the high-tension delta under the power transformers through a second set of H-3 automatic oil switches. The transformer bus line, built of ¼-in. x 2-in. copper bars, is inclosed in a 12-in. x 12-in. brick compartment running the full length of the basement. Each compartment is covered with albarene composition stone.

The two sets of 700-kw General Electric air-blast transformers are furnished with air by two 20,000-cu. ft. American blowers of the Sirocco type 7, direct-connected to two 20-hp induction motors which are supplied with energy from the low-tension side of transformers. Either blower is of sufficient size to furnish air to both transformers and is supplied with a grated intake in the station floor 7 ft. x 7 ft. 10 in. in size. To utilize all the available space in the station and at the same time provide a large air reservoir for the air-cooled transformers, the high-tension bus chamber, which is 22 ft. 6 in. x 53 ft. in plan, was employed by the installation of an air-lock entrance.

Two 2000-kw General Electric type H.C.-16 rotaries have been installed, and space has been provided for a third. At this time the load normally coming to this station is 2000 kw, which allows one rotary to be employed as a spare. Owing to load transfers which are continually taking place, however, both rotaries may be called into service at any time, and, in fact, cable repairs in the loop distribution system have brought at present a peak of 3500 kw to this station. The rotaries are diametrically connected and are supplied with 430 volts a.c. from the low-tension side of the transformers, delivering 600 volts d.c. Each rotary is started by a one-third to two-thirds voltage tap taken out of the transformer through a set of starting switches. The running taps are made through ¼-in. x 4-in. copper bars and the starting taps through ¼-in. x 3-in. bars. Each rotary is provided with a magnetic oscillating device which is connected to the 600-volt d.c. side of the rotaries. A small rheostat mounted on the rotary bedplate beneath the armature shaft bearing is connected on the oscillator circuit and controls the oscillation.

All wiring in the basement is carried on 1¼-in. racks clamped to the lower flanges of the floor beams. The negative and equalizer buses are carried along the walls of the rotary pit on iron brackets. The negative leads are dropped to the pit floor level where they are incased in concrete ducts surrounded with loose sand. The sand-filled ducts are covered with a concrete slab with a groove in the floor to show its width.

The positive leads are also supported on pipe racks from the rotaries to the switchboard and consist of 4¼-in. x 5-in. copper bars. Just under the switchboard two type F 600-volt field rheostats have been supported on the floor beams for operation from hand wheels which are mounted on the switchboard. Beside these two rheostats a battery-charging rheostat has been installed on a pipe rack which supplies energy to a type E-5 sixty-cell Electric Storage Battery set. These batteries are employed in operating the oil switches and are installed on reinforced concrete shelves extending from the floor to the ceiling of the basement close to the Franklin Street wall.

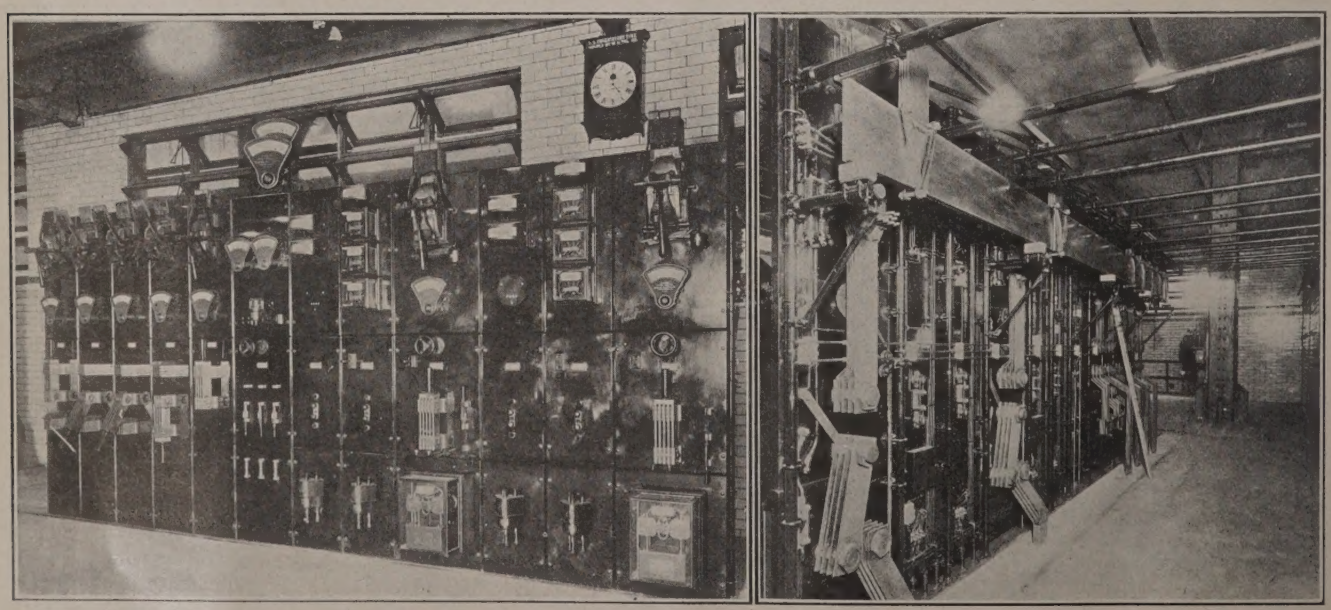


Franklin Street Substation—Cross-Section Through Line A-B on Plan

Four sets of outgoing lead-covered feeders, each with 4,500,000 circ. mil equivalent, enter the underground feeder system through an opening in the basement wall. Each set of feeders includes three conductors which connect to ¾-in. x 5-in. bars a short distance from the duct opening. As copper bars have been installed between the ducts and the switchboard, disconnections may be made quickly in case of a breakdown.

In addition to the basement equipment already described, a Westinghouse motor-driven air compressor of 390 cu. ft. per minute capacity when operating at 170 r.p.m. has been included to supply air to the pipe system which is employed in cleaning out machinery. A 2½-hp, 600-volt d.c. drive sump pump has been included in the basement drainage system, as the floor level is below the city sewer. This pump is started automatically by a float valve in the sump, and all water first passes through a catch basin which removes the sediment.

The substation switchboard consists of twelve panels distributed as follows: four feeder panels, one battery panel, two high-tension line panels, two a.c. and two d.c. rotary panels and one auxiliary bus panel. The switchboard, which is of black enameled slate, is mounted on insulating board set in the floor and is supported from the station wall by insulated pipe struts. The only special instruments included in the switchboard equipment are a wattless compound indicator for each rotary and a printometer operated by a Western Union clock which records the total current consumption every fifteen minutes.



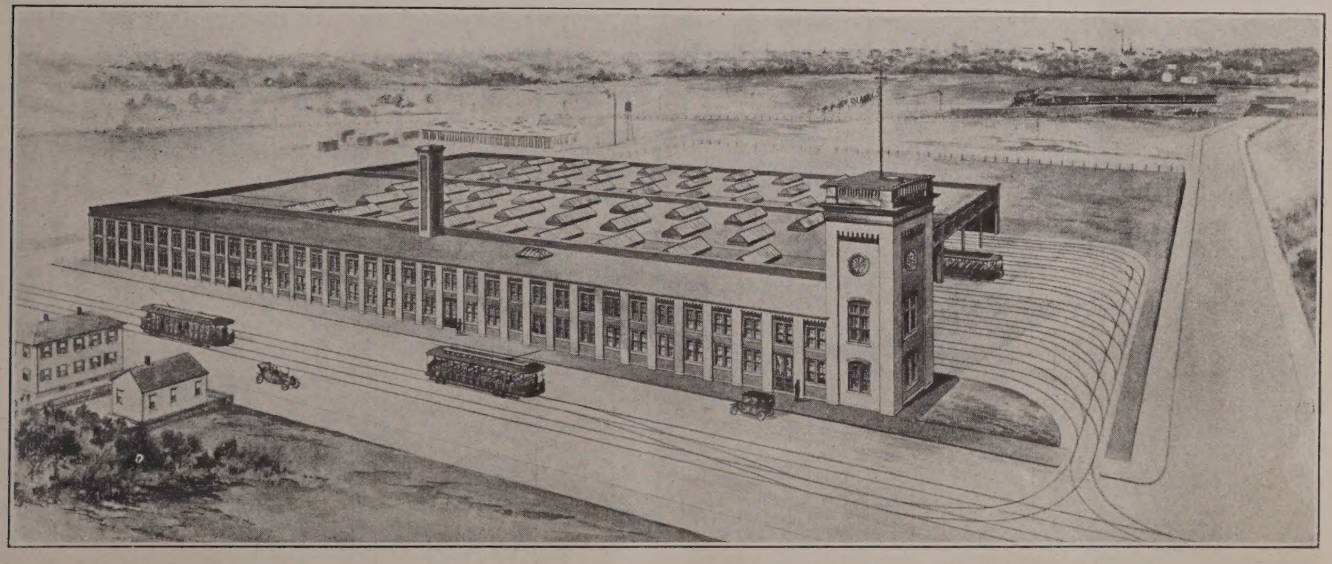
Franklin Street Substation—Front and Back of Main Switchboard

The Franklin Street substation was designed and built by the engineering department of the elevated railways under the supervision of E. J. Blair, electrical engineer.

Cranston Carhouse of the Rhode Island Company

A Building of Mill Construction of Which Only the Section with Pits Is Fully Inclosed

The Rhode Island Company, Providence, R. I., is now completing an operating carhouse and light repair shop at Cranston Street and Burnham Avenue, in the city of Cranston, close to the city line of Providence, which will have a capacity of ninety-six 40-ft. cars on twelve tracks. As the company owns the adjoining land on this block, however, this capacity can be more than doubled whenever the need arises. This building will replace one having a capacity of but thirty-six cars. The new carhouse is of the single-end type on account of unfavorable topographical conditions. As presented in the accompanying plan, the building is divided into two six-track bays, each 72 ft. wide and about 360 ft. long, and into a series of utilities rooms along one side, as hereinafter described. Architecturally this structure is one of interest through the provision of a handsome square clock tower which will show four clock faces of 5-ft. diameter each.



Cranston Carhouse—Perspective View Showing General Design and Track Entrances

CONSTRUCTION MATERIALS

The greatest total length of the building is 400 ft. Mill type construction is used. The walls are of brick with concrete for the underpinning and foundations. The walls and longitudinal partitions are 16-in. brick with 8-in. pilasters spaced 10 ft. center to center and 12-in. brick walls are used for the partitions between most of the utilities rooms. The bricks for the exterior walls have ruled joints and are laid in lime and Portland cement mortar. The 10-in. x 10-in. yellow pine cast-iron capped columns between the tracks rest on 18-in. concrete piers and carry 12-in. x 16-in. longitudinal girders and 10-in. x 14-in. roof rafters, which are roofed over with 3-in. splined spruce and five-ply tar and gravel Barrett specification roofing. Extra girders 10 in. x 14 in. in size are installed at the location where the car-body hoist is used. The roof is pitched ½ in. per foot. The center to center column spacing throughout is 20 ft. longitudinally and two tracks, or an average of 24 ft. transversely. The only steel employed in the construction of the carhouse proper consists of four Bethlehem 15-in. 73-lb. H-beams, which are used as entrance columns. Approximately 25 per cent of the roof area is covered with dog-house type skylights 9 ft. x 18 ft., with metal frames. This arrangement, in connection with the extensive use of factory-ribbed wire glass, gives ample natural light.

The devil-strips and aisles of the carhouse are composed of 4-in. cement concrete reinforced with American Steel & Wire Company's triangle mesh reinforcing metal and having a granolithic finish given to it. The floor of the carhouse at pit level is of 4-in. cement concrete, but tar concrete is used in the operating section of the carhouse. Concrete floors are also provided for the various utilities rooms, except that maple flooring 3 in. wide is used in the offices, men's rooms and repair shop. The two large lavatories have asphalt floors.

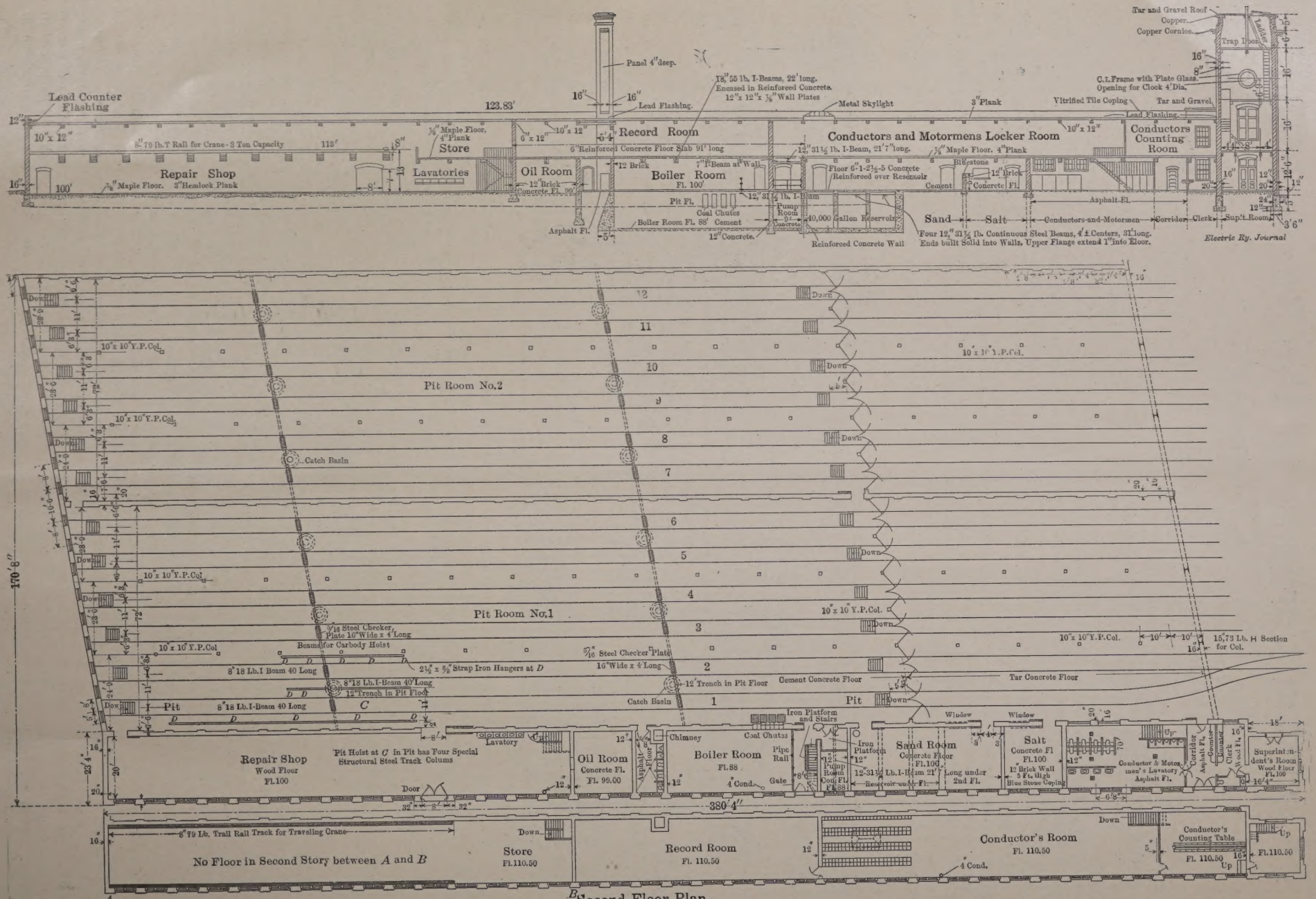
M. H. Bronsdon, then electrical and chief engineer of the Rhode Island Company, determined that a carhouse built of the materials hereinbefore described should not cost more than $1.20 per square foot of floor area, exclusive of the outlay for the heating, fire protection and lighting systems, or $1,000 per car capacity for the carhouse completely equipped.

FIRE PROTECTION

Fire protection is given by a combination of Grinnell automatic sprinklers of roof type and fire hydrants, all in accordance with the requirements of the New England Insurance Exchange. Each sprinkler protects an area which averages 80 sq. ft. The dry-valve system is employed in the operating section of the building, which is partly exposed to the weather, but the wet-valve system was chosen for the pit section in view of a door arrangement which permits the pit room to be easily heated at all times.

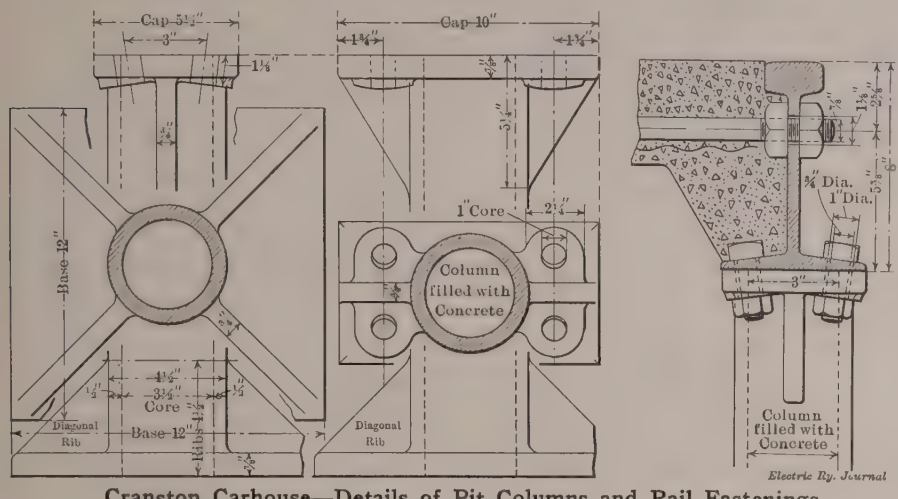
The sprinkler system is directly connected to the city's high pressure (125-lb.) independent fire service, and as a second source of water supply there has been provided inside of the building a four-chamber reinforced concrete reservoir of approximately 50,000 gal. capacity. There is also provided a centrifugal, motor-driven pressure pump with a capacity of 750 gal. per minute, which is also connected to the sprinkler system and which will be placed in operation immediately should fire break out anywhere in the building.

The amount of water in the tank of the reservoir is suffi-



Cranston Carhouse—Plan of First and Second Floors and Longitudinal Section

cient to supply all of the sprinklers, should they all open, for a period of one hour. There is also an arrangement by which the city's water will flow into the reservoir as required. All division walls throughout the building are carried up through the roof to act as fire walls and are capped with vitrified tile coping. All door openings, except in the superintendent's office, are provided with tin-clad automatic sliding fire doors on both sides of the opening.



Cranston Carhouse—Details of Pit Columns and Rail Fastenings

DIVISION INTO OPERATING AND PIT SECTIONS

From the accompanying plan it will be seen that each bay of the carhouse is divided into an operating section for a distance of about 100 ft. and into a pit section for about 260 ft., the two portions being separated by wooden doors, which swing outward toward the operating section. The usual doors at the entrance to the carhouse are omitted. The object in dividing the carhouse in this way is to insure the isolation of cars which are in for repairs from those which enter merely for layovers. When this distinction is observed, therefore, it is unnecessary to open and close the doors continually, and the heating of the pits is greatly simplified.

By means of this scheme two live cars may be maintained on each track and six dead cars over the pits. It is, of course, unnecessary to mark the cars in any way, as their position outside the pit section indicates that they are available for service. As the building faces the south the absence of doors at the track entrances is not a serious matter because very little snow is likely to drift in, even in heavy storms. The building is so planned that it is necessary to bring operating cars over the pits only when they have to be repaired, or in extremely snowy or very cold weather when it would be desirable to melt off the snow or ice.

Entry is made to the carhouse by twelve ladder tracks with hard-center special work. The tracks in the pit section are Lorain 79-373-8-in. T-rail, and the remainder are A.S.C.E.-70-lb. section.

PIT CONSTRUCTION

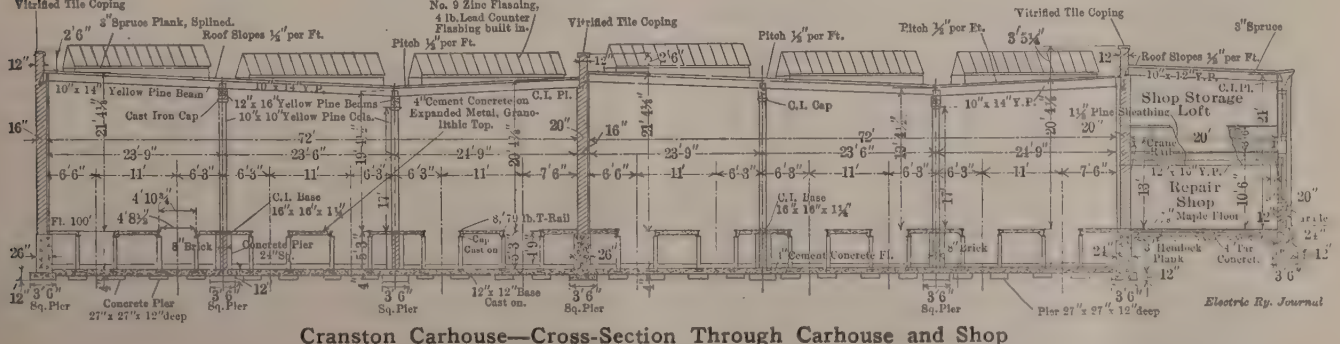
As shown in the accompanying cross-section, the pits are of the open type. The pit posts are hollow cylindrical cast-iron columns of 4½ in. diameter, filled with concrete and spaced 10-ft. centers. The running rails are bolted to a T-shaped cap which is cast on each post in such manner that the edge of the rail base is flush with the cap; thus there is no prominent projection against which a pitman would be likely to strike his head or knuckles. Furthermore, the tie-rods, which pass through the concrete devil-strip, have their ends cut off flush with the face of the rail head. The top of the rail is also flush with the devil-strip. The tie-rods are of ⅞-in. diameter and are spaced 3-ft. 4-in. centers. The pit floors are pitched to drains at two points as shown on the plan.

HEATING AND LIGHTING

The entire building is heated with hot water by a system which is patented and controlled by the General Fire Extinguisher Company. The boiler, which is of the Scotch marine type, with 1750 sq. ft. of heating surface, and also the entire system of radiating pipes, are entirely filled with water, there being no steam space whatever.

The circulation is effected by a motor-driven centrifugal pump of such capacity that the difference between the temperature of the water leaving the boiler and the temperature of the water returning to the boiler does not vary more than 6 deg. Fahr. Therefore on moderate days the water in the boiler is heated to about 130 deg. Fahr., while during cold or zero weather the water in the boiler is heated to about 180 deg. Fahr. This system, after five years' operation in one of the largest carhouses of the company, has been found to be more satisfactory for such buildings than steam or air. There are four 1¼-in. pipes placed on each side of each pit, which has proved to be ample radiating surface with hot-water heating. This system also requires less fuel and attention than is required for carhouse heating by steam, and in general it has been found to be very satisfactory.

The carhouse throughout is lighted with incandescent lamps. In the pit sections there is a row of incandescent lamps between each line of cars, the incandescent lamps being placed on 20-ft. centers. The operating sections which front the pit sections also have incandescent lamps placed on 20-ft. centers, one row of lamps being placed between two lines of cars. Each side of each pit has a row of incandescent lamps spaced 10 ft. center to center with the lamps staggered on each side so as to bring the light available for every 5 ft. in the pits. This system of lighting is used generally by the Rhode Island Company and has been found adequate.



Cranston Carhouse—Cross-Section Through Carhouse and Shop

ARRANGEMENT OF CARHOUSE AND UTILITIES SECTIONS

As previously noted, each of the two carhouse sections is divided into a pit section and a doorless anteroom for layover cars. Both pit rooms are substantially alike, except that tracks Nos. 1 and 2 in the pit room which adjoins the repair shop are furnished with a car-body hoist of I-beams 40 ft. long. Several jib cranes and a hydraulic wheel hoist are also installed at this location. An 8-ft. opening gives direct access from this wheel and truck section to the repair shop. Four coal chutes are also provided between track No. 1 and the rear of the boiler room so that fuel can be delivered via cars and dumped into the boiler room.

The utilities rooms on the first floor consist of offices for the superintendent and his clerks, a salt room, sand room, pump room, boiler room, oil room and the repair shop. Separate lavatories have been provided at the most convenient locations for the platform men, shopmen and pit workers respectively. The oil room is isolated from the other rooms by 12-in. brick walls, and its floor, which is several inches below the level of the other ones, is drained separately to the sewers.

The repair shop, which is approximately 20 ft. x 120 ft., will not be equipped for heavy work or manufacturing owing to the condition that this carhouse is very close to the main shops of the company. It will, however, contain a number of machine tools, suitable for wheel work, including a crane of 2 tons or 3 tons capacity. A gallery has been built in this shop for the storage of light stock.

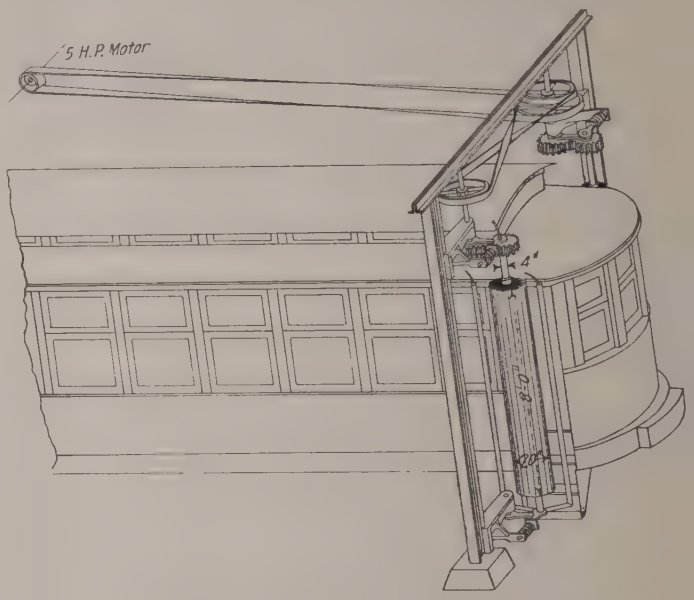
The second floor of the utilities section, which does not extend the full length of the first floor, is used by the motormen and conductors as a lounging room, for the making out of their reports, for storage and filing of transportation records, etc. The clock tower is 20 ft. square by 55 ft. 6 in. high. It contains the superintendent's room on the first floor and other offices of the department on the second floor.

LABOR-SAVING CAR-WASHING DEVICE

The accompanying illustrations show the general arrangement of a car-washing device invented by A. D. Campbell, master mechanic Seattle division Puget Sound Traction,

Seattle Car Washer Installed

Light & Power Company, and in use at the Georgetown shops of that organization. The device consists of a cylindrical brush 20 in. in diameter and 8 ft. high, mounted upon a vertical axis and driven in a wooden frame of adjustable design by a 5-hp, 550-volt d.c. motor located on the top of the frame. The framing is made up of 4-in. x 7-in. and 6-in. square timbers and can easily be installed between any two tracks of a car-washing floor. Water is supplied at

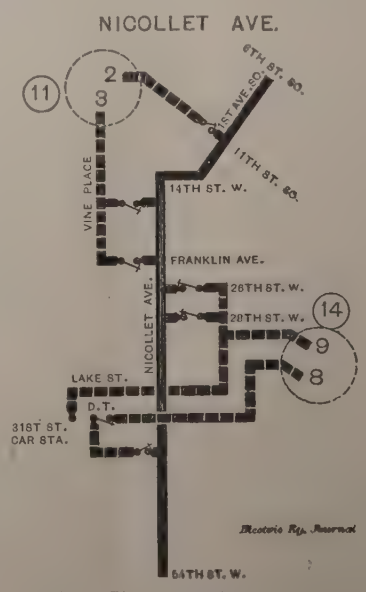


Application of Car Washer, Showing the Drive

the top of the brush by a 1½-in. pipe connected at its lower end with a valve and hose coupling. The motor starter and switch are located upon a post at the side of the washing device. Cars are washed by running them slowly past the rotating brush, which provides effective cleaning on the exterior of the body in much shorter time than is possible by hand and with nominal expense. The original design of the device provides for the use of a double set of brushes driven by a single motor of the size above stated so that each side of the car can be cleaned at the same time. The device is easily taken down and can be readily erected in other locations.

TWIN CITY FEEDER CONNECTION DIAGRAM

The power and equipment department of the Twin City Rapid Transit Company, Minneapolis, Minn., has recently devised a new method of advising the different substation operators of the possible connections that can be made through any given feeder panel. The method of conveying this information is by inclosing in a small frame on the switchboard a diagram showing in heavy black lines the existing lines fed through a given panel, and in dotted lines possible connections with switches noted at the various other stations which can be thrown in, connecting the panel with new feeder sections. One of the diagrams is mounted on each feeder panel at every substation. A typical diagram is shown in the illustration.



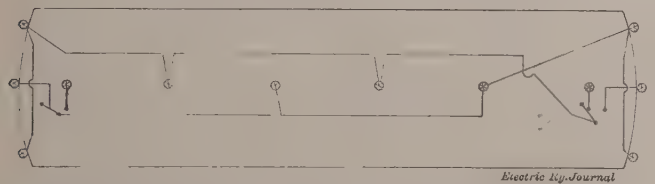
Twin City Typical Feeder Layout

Tungsten Car Lighting by the Bay State Street Railway

Six 60-Watt Tungstens Gave Better Illumination than Twenty-one 64-Watt Carbon Lamps

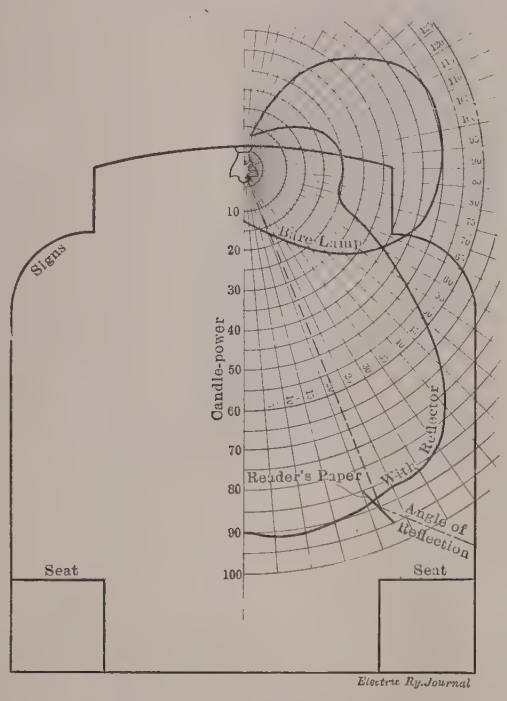
Recent improvements in the tungsten lamps have led to the inauguration of important tests in car lighting by the Bay State Street Railway, of Boston, Mass., the results of which indicate the probability of great economies over former methods. For some years the carbon filament lamp of an efficiency of 4 watts per cp has handled the car-lighting service on most street railways, but the advent of the wire-drawn tungsten filament has pointed the way to radical improvements in this branch of railway practice. The lamp efficiency is about 1.25 watts per cp, and although no definite figures are as yet available in regard to the life of these filaments in railway service, cars thus equipped have been in successful operation for several months, indicating a reasonable degree of ruggedness in the lamps. On account of its resistance characteristics the tungsten filament is much less susceptible to changes in candle-power with varying voltage than the carbon, so that it will stand a higher over-voltage than the latter and will also give a fair illumination at low voltage under which the carbon lamp gives practically no light.

The simplest method of applying the tungsten lamp to car-lighting service is the substitution of these lamps, unit for unit, so as to increase the illumination and at the same time make a considerable saving in energy consumption.



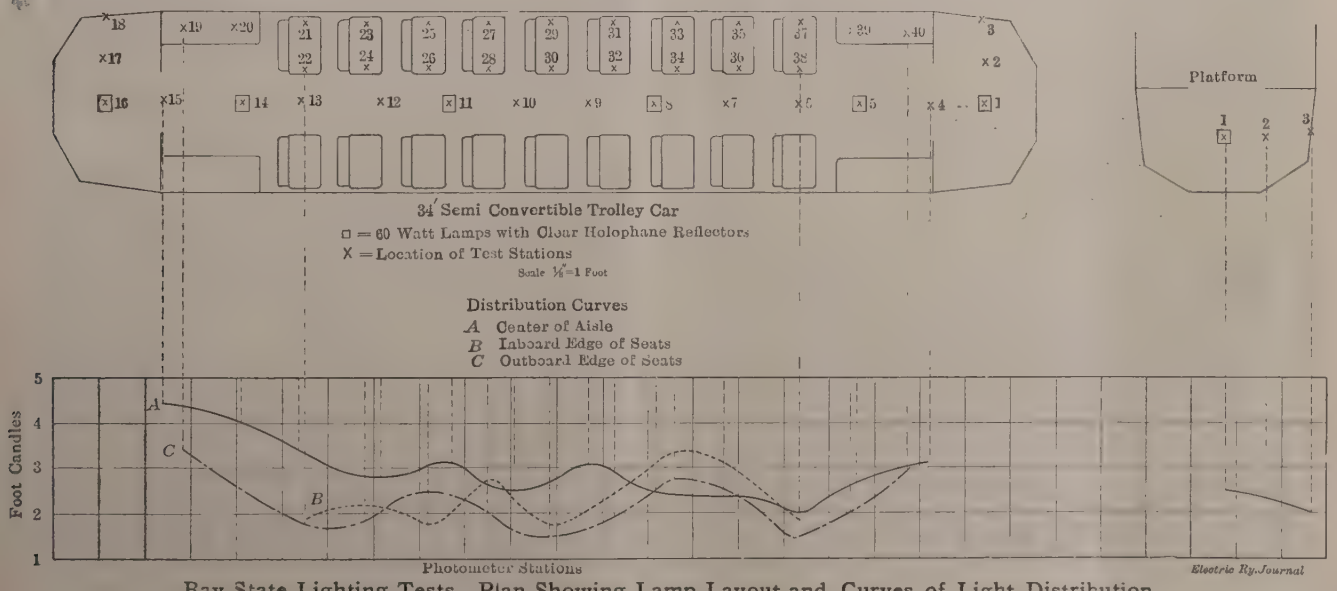
Bay State Lighting Tests — Car-Lighting Circuits for Tungsten Lamp Tests

This arrangement, however, does not reduce the glare, nor does it secure as good maintenance economy as a smaller number of higher-powered units equipped with suitable reflectors. The larger lamp not only has a lower cost per cp, but is intrinsically more hardy, and the reflector, as shown diagrammatically in the accompanying chart, directs the light downward where it is needed and restricts the intensity in those angles near the horizontal where a strong light results in discomfort to the eyes. The chart does not allow for interior reflection, but shows the striking theoretical gain secured by the use of shades, the glare on the reader's paper being entirely eliminated where the light is thrown downward at the proper angle.



Bay State Lighting Tests—Relative Distribution of Light from a 60-Watt Tungsten Lamp with and without Reflector (No Account Taken of Wall and Ceiling Reflection)

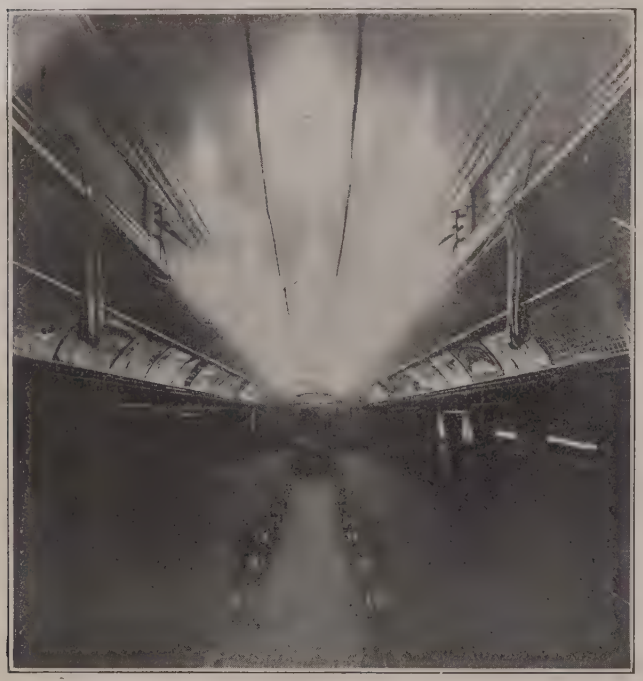
In the tests made by the Bay State company four semi-convertible cars were equipped, two 34-ft. cars being mutu-



Bay State Lighting Tests—Plan Showing Lamp Layout and Curves of Light Distribution

ally compared, as shown in two of the halftone illustrations and two 28-ft. cars as in the other two illustrations.

The general method of conducting the tests is shown in the accompanying plan, which illustrates the location of



Bay State Lighting—34-ft. Semi-Convertible Car Lighted with Twenty-One 64-Watt Clear Carbon Lamps without Reflectors

lamps and test stations in a 34-ft. car and gives the curves of light distribution at various photometric stations along the center aisle, inboard and outboard edges of seats. The photographs of the car interiors were all taken at night as

Bay State Lighting—28-ft. Semi-Convertible Car Lighted with Sixteen 64-Watt Clear Carbon Lamps without Reflectors

nearly as possible under the same conditions, each being exposed ten minutes with the same stop and lens and without any other light than that furnished by the car equipment. The tungsten lighting equipment of the 34-ft. car consisted of two circuits aggregating ten 60-watt clear series "Mazda" lamps with "I-60" clear holophane reflectors, the same equipment being used in the 28-ft. car for electrical reasons. The car interiors, including plat-

Bay State Lighting—34-ft. Semi-Convertible Car Lighted with Six 60-Watt Clear Tungsten Lamps with 1-60 Clear Reflectors

forms, in each case were lighted by six of the above lamps arranged in separate circuits as shown in the wiring diagram, so that the end markers and headlights are properly included with respect to the direction of car travel. The

Bay State Lighting—28-ft. Semi-Convertible Car Lighted with Six 60-Watt Clear Tungsten Lamps with 1-60 Clear Reflectors

lamps were provided with special shade holders designed to prevent the working loose of the reflectors, and the lamps were alternated to maintain a fair illumination in case of the failure of a lamp. The lamps were installed

in the middle of the upper deck. The 34-ft. car interior equipped with carbon lamps was lighted by twenty-one 64-watt units without reflectors, five-circuits being installed. The corresponding 28-ft. car was furnished with sixteen 64-watt lamps arranged in four circuits, without reflectors. Readings were taken by a Sharp-Millar photometer, showing the intensity of illumination in foot-candles on a horizontal plane 3 ft. above the floor of the car. It may be noted that from 2 to 2.5 ft. can also give an excellent reading light.

The effectiveness of the new system in giving the strong light required on the reading level is confirmed in the following table, which gives the comparative values of the intensity of illumination in various parts of the cars under both systems of lighting:

COMPARATIVE ILLUMINATION IN HORIZONTAL PLANE 3 FT. ABOVE FLOOR OF CAR.

	28-Ft. Cars.		34-Ft. Cars.	
	Car No. 1407. Six 60-Watt Mazdas. Ft.-Candles.	Car No. 1400. Sixteen 64-Watt Carbons. Ft.-Candles.	Car No. 1321. Six 60-Watt Mazdas. Ft.-Candles.	Car No. 1324. Twenty-one 64-Watt Carbons. Ft.-Candles.
Platform:				
Maximum	3.5	1.0	2.5	2.3
Minimum	2.3	0.5	1.1	1.6
Average	2.9	0.8	2.1	2.0
Center line car body:				
Maximum	5.7	2.9	4.4	3.5
Minimum	2.8	1.4	2.0	2.1
Average	4.0	2.2	2.9	2.9
End seats:				
Maximum	3.6	2.4	3.4	3.0
Minimum	1.0	1.9	2.1	2.1
Average	2.3	2.2	2.8	2.5
Inboard edge cross seats:				
Maximum	4.8	3.9	3.4	2.9
Minimum	3.5	2.1	1.8	1.9
Average	4.4	2.7	2.3	2.4
Outboard edge cross seats:				
Maximum	5.5	3.1	2.8	2.7
Minimum	3.3	1.9	1.5	1.7
Average	4.4	2.6	2.0	2.2
Averages for whole car	3.6	2.1	2.4	2.4

It will be seen that with the tungsten lamps the increasing intensity is obtained with considerable saving in energy consumption; that is to say, two circuits of tungsten lamps replace four circuits of carbon lamps in the 28-ft. car and five circuits in the 34-ft. car, the energy consumption per circuit being practically the same in all cases. With the new arrangement light is directed upon the seat where it is required, while with the old installation the lighting is concentrated in the upper part of the car.

The tests, which are still being continued, have been carried out under the direction of E. W. Holst, superintendent of equipment Bay State Street Railway, Boston, Mass., with the co-operation of G. H. Stickney, of the Harrison (N. J.) lamp factory of the General Electric Company.

RAILWAY APPLIANCE EXPOSITION BUILDING

The International Amphitheater, the official name of the railway appliance exposition building at Chicago, is situated on the site of the famous Chicago Union Stock Yards. The yards proper occupy a frontage on Halsted Street between Thirty-ninth and Forty-seventh Streets. The amphitheater is situated between Root and Forty-second Streets, fronting on Halsted Street. It may be reached by any of the surface lines running south from the Loop district between Wabash Avenue and Halsted Street, by transferring at Thirty-ninth Street. A transfer is not necessary on the Halsted Street line. The most direct and quickest route from the center of the city is by way of the South Side Elevated, a change being made to the Union Stock Yards branch at Fortieth Street and Indiana Avenue. The shortest surface line route is by way of the Halsted Street cars which run into the Loop on Clark Street. The trip by this route requires about twenty-eight minutes. The local trains on the elevated require twenty minutes, and the express trains to Fortieth Street reduce the local time to sixteen minutes from the Loop to the Union Stock Yards.

The International Amphitheater is of fireproof construction, being built of concrete, brick and steel. It was constructed in 1905 at a cost of $280,000 as the home of the International Stock Show, which takes place annually. In addition to this the building is used for various exhibitions and offers the largest floor space in Chicago. The amphitheater covers an area of 310 ft. x 600 ft. and includes 243,600 sq. ft. of floor space. The auditorium is 200 ft. x 310 ft. in plan, with an arena 100 ft. x 250 ft. In preparing this auditorium for the railway appliance exposition, the arena, which normally has a clay floor, is being floored over, and the gallery is being arranged for exhibit space. The ground-floor level under the galleries will also be occupied by exhibits. Opening to the right and left of the Halsted Street entrance are two pavilions, 125 ft. x 165 ft. in plan. At the rear of the arena an archway on either side opens into what are known as the North and South Straightaways. These are approximately 50 ft. x 165 ft. in size. The Stock Yards Inn and track space for car exhibits are reached by the north entrances to the North Straightaway and the North Pavilion.

Interior of Convention Hall

At the present time the work of laying the floors and building the galleries has been completed, and a large force of workmen is engaged in placing the decorations. These promise to be novel and very attractive. The exhibits have begun to arrive, and a number of representatives of the manufacturers are on the ground supervising the installation of their exhibits. That the exposition this year is proving very popular and will exceed in size any other exhibition of this character given by the association is evidenced by the fact that a large number of applications for exhibit space have been refused. H. G. McConnaughy, director of exhibits, is rushing all preparations to completion, devoting his entire time to this work.

The report of the Bradford (Eng.) City Tramways, which now consist of nearly 55 miles of route, shows operating expenditure amounting to £172,216, or 7.304d. per car mile, and receipts totaling £286,164, or 11.883d. per car mile, for the tramways, and expenses of £786, or 6.623d. per car mile, for the railless system, with a revenue of £848, or 7.148d. per unit. Including the parcels department, the gross profit carried to net revenue account is £109,200. The final balance after paying rents of lease, lines, interest, etc., is £83,927, of which £31,144 is absorbed by capital charges, £30,783 is carried to reserve or renewal fund, and £22,000 contributed to relief of rates.

September Meeting Illinois Electric Railways Association

Papers Were Presented on Advertising, Use of Sand and Snow Problems.—Cab Signals Were Also Discussed at Length

The regular September meeting of the Illinois Electric Railways Association was held at the La Salle Hotel, Chicago, Sept. 20. About forty members were in attendance and some interesting discussions followed the reports of various committees and the reading of papers. The morning session opened with President E. C. Faber presiding. After Secretary Flenner had read the minutes of the preceding meeting Mr. Faber called for the reports of the various standing committees.

MAP

Frank E. Johnson, of the Ohio Brass Company, chairman of the membership committee, reported two applications. A. W. Jordan, traffic agent of the Chicago & Joliet Electric Railway, reported progress in the work assigned to the traffic committee and submitted samples of a proposed map with bids from a number of companies covering the initial preparation of the plates. At the conclusion of the inspection of the sample map submitted by the company which had made the low bid, the traffic committee was instructed to prepare a map showing the electric railways in heavy lines and the steam-road connections in lighter lines. H. E. Chubbuck, vice-president executive of the Illinois Traction System, recommended that the map include the territory between Cleveland, Ohio, and some point west of Davenport, Ia., this being the same width north and south as the Central Electric Railway Association map. The association agreed to assume the cost of the plate in proportion to the member companies' mileage and that each company could order as many prints as it desired.

DISCUSSION ON CAB SIGNALS

John Leisenring, signal engineer Illinois Traction System, reported, as chairman of the committee on signals, that his committee had made an inspection trip over the Indianapolis & Cincinnati Traction Company's lines where the Simmen signal system has recently been installed. The committee also inspected the light signals on the Terre Haute, Indianapolis & Eastern Traction Company's lines. Mr. Leisenring informed the association that the trip had been very instructive and that valuable data had been collected. As P. J. Simmen was in attendance, Mr. Leisenring recommended that he be asked to explain the fundamental principles in the design of his signal system. He said further that the results obtained so far in operating the signals on the Indianapolis & Cincinnati lines were very satisfactory; the signals had proved very efficient and at the same time simple mechanically and in operation.

Following Mr. Leisenring's suggestion, Mr. Simmen explained the fundamental principles of the signal by replying to a number of questions asked by the members of the association. In replying to Mr. Faber's question relative to whether audible signals could be installed in the cab in place of the light signals, Mr. Simmen said it was a very simple matter to include bells or any other device which would give an audible indication, but he did not think an audible signal was as reliable as a light signal. He also said that in order to draw the motorman's attention to the light signal at the time of passing over a section of contact rail it was his intention to include some audible indication that the car was passing a contact-rail section. He further said that the signal circuits were operated at 30 volts d.c. and that the shoe exerted a pressure of about 30 lb. on the third rail. In explaining this increase in pressure over the usual shoe used in third-rail operation, Mr. Simmen said that the pressure could be increased because the contact-rail sections were short. Replying to a further question from Mr. Faber, he said that this increase in the pressure of the shoe on the contact rail was sufficient to clear the rail of sleet, thus assuring contact in all kinds of weather.

The question arose as to whether the spacing of the Simmen signal, as compared with the ordinary block signal, would in any way affect the attention which the motorman would pay to the cab indications. Mr. Simmen said that he was sure his system had overcome any liability of this kind by placing the signal before the motorman's eyes in the cab, thus making it more effective and at the same time visible in all kinds of weather.

Mr. Chubbuck, of the Illinois Traction System, suggested that there was nothing on the right-of-way to indicate to passengers that the road was equipped with signals. He also said that he felt sure that the automatic block to a certain extent increased traffic because the passengers could see the indications and feel safer when a car was operating at high speed. In reply to this Mr. Simmen said that the light indications shown in the motorman's cab could be installed in the car. In fact, such an arrangement had been suggested. But after careful consideration the Indianapolis & Cincinnati Traction Company decided that in case there should be a red indication it might stampede the passengers unnecessarily; therefore it would be better to show the indication to the motorman only.

The question then arose as to whether the Simmen system of signaling protects trains against open switches. Mr. Simmen said that the complete system did include protection against open switches and that the Indianapolis & Cincinnati Traction Company was testing this feature of the system at one siding. Mr. Leisenring explained this single installation by saying that Charles L. Henry, president and general manager of the company, wanted to make the installation as simple as possible at first and add the auxiliary features as they were required. Mr. Chubbuck then questioned the advisability of changing over from continuous track circuits to intermittent third-rail circuits, stating that he felt that the track circuit was a very important feature of the continuous block system and should not be set aside without careful consideration.

Mr. Leisenring explained the simplicity of the signal equipment on a car. He said that the full installation did not require a complete overhauling, but the equipment was so simple that it could be added to the car without any great expense. The contact-rail shoe was probably the biggest item of expense, as it contained practically the entire operating mechanism. In concluding his report of the inspection trip on the Indianapolis & Cincinnati Traction lines, Mr. Leisenring advised the association that a light signal was between 5 per cent and 25 per cent cheaper than an automatic signal, but that it cost between 6 per cent and 7 per cent more to maintain it. The maintenance and operation, however, could be reduced either by turning the lights out at night when the line was not in operation or by an automatic mechanism which would turn on the current when the car approached the signal. He said that the cost of operation was now being reduced on the Indianapolis & Cincinnati lines by the installation of a 20-watt and 60-watt lamp in the signal, the low-wattage lamp burning at all times, and as a train approaches a signal the 60-watt lamp is cut into the circuit.

Replying to a question asked by Charles J. Jones, of the

Aurora, Elgin & Chicago Railroad, relative to the practicability of installing the Simmen system on a third-rail road, Mr. Simmen said that was merely a question of locating the third-rail so that the shoe used in operating the cab signal would not come in contact with the third-rail supplying energy to propel the car.

At the conclusion of this discussion President Faber instructed Mr. Leisenring to make a complete written report of the result of his committee's inspection trip so that it could be included in the report of the block signal committee submitted in May at the Springfield meeting.

CONSTITUTION AND BY-LAWS

Coming up as a portion of the unfinished business, the constitution and by-laws of the proposed Illinois Traffic Association were discussed. Letters had been sent to the various member companies inclosing a copy of the constitution and by-laws and requesting their approval. Practically all the member companies replied in approval, but they questioned the advisability of organizing a separate association to handle the interchange of traffic between the electric lines. President Faber also questioned the advisability of forming such an association until the parent association had grown to the point where the work required of it could not be handled at the regular meetings.

COUPON BOOKS

Mr. Chubbuck moved that, in view of the desirability of the interchange of tickets between the electric roads, the traffic committee of the parent association be authorized to agree on rates and purchase the necessary coupon books, so that all the member companies could test their use.

READING AND DISCUSSION OF PAPERS

At the conclusion of this discussion J. J. Rockwell read his paper on "Value of Definite Policies in Advertising," at the close of which he received a vote of thanks from the association and the meeting adjourned until the afternoon session. Mr. Rockwell's paper was printed on page 458 of the ELECTRIC RAILWAY JOURNAL for Sept. 21, 1912.

The afternoon session included the reading of a paper by Charles J. Jones, superintendent of transportation of the Aurora, Elgin & Chicago Railroad, on "Handling Traffic in Winter," and one by W. H. Evans, manager motor and gear department of the Edgar Allen American Manganese Steel Company, on "Sand." Mr. Jones' paper is printed elsewhere in this issue, while that by Mr. Evans was published on page 459 of the ELECTRIC RAILWAY JOURNAL for Sept. 21.

At the conclusion of Mr. Evans' paper the different members of the association were questioned as to whether they used sand or not. Mr. Chubbuck said that his company had sand on its cars, but only used it in cases of emergency. Mr. Faber said that owing to the weight of its cars the Aurora, Elgin & Chicago Company deemed it advisable to remove the sand from them altogether, consequently no sand is now being used on the passenger equipment. However, electric locomotives which pull freight trains are equipped with sanding devices for use on heavy grades and in emergencies.

The conclusion drawn from this discussion, in which all the members took part, was that sand is a good thing if used judiciously, but that preferably it should be employed only in cases of emergency. It was advisable, however, to use sand on steep grades and the cheapest way to take care of places of this character was not to equip the cars with sanding devices, but to place a man on the ground when the rail was slippery and the grade needed sanding. The whole question of the use of sand was in its application to interurban railways, and it was generally decided that there was a necessity for sanding devices on city cars, particularly where the rail was wet and slippery.

GENERAL

At the conclusion of the discussion on sand, President Faber stated that, owing to the fact that C. F. Hewitt, formerly general superintendent East St. Louis & Suburban Railway, and C. H. Cox, general manager Central Illinois Public Service Company, had left the State, he had named B. I. Budd, president Chicago Elevated Railways, and A. J. Purinton, new general superintendent East St. Louis & Suburban Railway, as members of the committee on membership. Since R. A. Barnett, traffic agent Chicago & Southern Traction Company, had also left the State, G. W. Quackenbush, traffic manager Illinois Traction System, was made chairman of the traffic committee.

It was decided to omit the November meeting of the Illinois association and not to meet again until the annual meeting in January, on account of the convention of the American Electric Railway Association in Chicago in October. It was suggested, however, that members of the Illinois association get together at a lunch which would be arranged for by the secretary of the association during the meeting of the national association. The secretary was also instructed to arrange for a booth at the exhibit hall, which will contain telephones, a map of the interurban lines in the State of Illinois, advertising matter of the various electric railways and ribbon badges bearing the initials of the Illinois Electric Railways Association in sufficient number for the members to wear one along with the badge of the national association.

HANDLING TRAFFIC IN WINTER*

BY CHARLES J. JONES, SUPERINTENDENT OF TRANSPORTATION AURORA, ELGIN & CHICAGO RAILROAD

The subject of winter service is one which seems to be pertinent to the meteorological conditions where the traffic is being handled. In sections where there is little or no snowfall the problem differs but little from continuous summer conditions. Where the winter is a season of several months' rain it is necessary to construct the roadbed with a sufficient number of waterways to avoid a break from washouts. In northern districts the question of maintaining the schedule in winter becomes at times a difficult one and is a source of anxiety to all railroad men. Snow, sleet, ice and frost are the trouble makers then to be looked for. The railroad manager who contends successfully against them is the one who has made full preparation for the battle before the winter has made its appearance.

WORK OF THE WAY AND LINE DEPARTMENTS

The maintenance of way department should see to its waterways and bridges, and where pile bridges are maintained over streams such tools and explosives as are necessary to protect the supports from ice should be on hand and ready for use. Heaving track is a menace to the safe operation of trains and is a frequent cause of delay to the service. It seems almost impossible to obviate this trouble entirely, but as it is usually the result of poor drainage, it is important that all ditches in the cuts should be cleaned before the frost comes. When certain cuts cannot be properly drained by the ordinary ditch, it is necessary to lay drain tile a few feet below the ditch in order to draw away the moisture from the subsoil.

Sleet and ice coupled with high winds are serious factors to be considered in the proper maintenance of transmission lines and the assurance of a continuous supply of power. Poles and cross-arms should be carefully inspected and strengthened where necessary, new insulators should replace doubtful ones, and all wires, telephone, trolley and transmission, should be looked over and the weak places made strong. On lines where the third-rail takes the place of the trolley wire the same careful inspection should be made and proper attention given to the insulators, the underground cables with the necessary drainage thereof and the cable terminals. The loss of power for a short time

*Abstract of paper read at a meeting of the Illinois Electric Railway Association, Sept. 20, 1912, Chicago, Ill.

during the progress of a winter storm may mean the loss of train service for many hours.

PREVENTION OF SNOW ACCUMULATION

Methods of preventing snow accumulation as applied to interurban lines include the widening of cuts and the use of snow fences. Where trouble from snow drifts occurs annually a permanent board fence may be erected in lieu of the usual right-of-way wire fence. Frequently we use boards nailed to the regular fence, supporting them by nailing to the fence wire and in the center with an intermediate post. Portable snow fences may be set out in the fall and removed in the spring. These are usually made in panels of about 16 ft. long and 6 ft. high and should be set from 50 ft. to 100 ft. from the track.

As a rule, the land owners do not object to allowing these fences on their land, but in some cases compensation is demanded. A wise forethought while securing right-of-way has in some instances provided for the right to use portable snow fences on the adjoining property, and where possible it should always be done. These fences cost about 25 cents per linear foot and when properly placed are extremely valuable in preventing the snow from drifting into the cuts. Their length should be added to each season. As the snow piles up around them these fences can be raised on the drifts or set farther back as occasion warrants.

There seems to be no reason why the wire right-of-way fence should not be replaced in places subject to snowdrifts by hedges of osage orange, honey locust or other hardy growth, such as the Japan privet and Tartarian honeysuckle, which could be kept trimmed to fence height. In addition to acting as a partial protection against drifting snow, they would make a permanent right-of-way fence, neat in appearance and an effective cattle guard.

REMOVAL OF SNOW

Methods of snow removal are various, including many devices from the man with the shovel and the light rail scraper to the powerful mechanical plow. The man with the shovel is not to be disregarded, as he is an essential factor in any snow-fighting equipment. His limitations, however, are apparent to anyone who with a hundred and more men has attempted to clean snow from track in the face of a gale of wind, the air dense with drifting snow and the temperature about zero. No doubt he has felt not only the effect of exposure to the storm but also that of discouragement when, upon looking back to see the result of his efforts, he has found that the section just cleared from snow was full again.

On city lines it is usual to equip the cars with scrapers, which are under the control of the motorman and so arranged that the blades are held on the rail under pressure. On all unpaved streets and highways it is important that the mud and dirt be scraped aside and leveled down to the rail before it becomes frozen. If this is not done, the scraper will not be able to reach the rail and the motor and gear casings will be dragging on the high places.

The rotary broom sweeper is used especially on city lines. As it is very effective, it should be included in the snow-fighting equipment of all companies that operate cars on streets and highways. These sweepers may also be equipped with wings which push the snow beyond the range of the brooms. Inasmuch as the sweeper throws a cloud of snow, it is important that those who are selected to operate it should be men of good judgment, because the flying snow invariably frightens horses. The electrical equipments to operate these sweepers vary, according to the ideas of the purchaser, but the mistake of having slow-speed motors to drive the brooms should be avoided.

On lines operating on private right-of-way in the open country the high V-shaped nose plow and center share plow are highly efficient. These plows are also equipped with adjustable side wings to push the snow further aside. These types of plows practically shove their way through the snow. The secret of their success is weight of car and high speed. They should have the speed of the fastest passenger car on the system, in order to be able both to run ahead of the scheduled cars and keep clear of them and also to clear a larger track mileage. On a snow plow of the center-nose type built on a flat car 34 ft. long and 50 ft. long over the points of the plows, with wings open to clear a width of 11 ft., weighted down with rails and old iron, equipped with four 125-hp motors and geared to a speed of 72 m.p.h., I have passed through snow drifts varying from 2 ft. to 10 ft. deep and 2000 ft. long without trouble. Passenger, freight and express cars are frequently equipped temporarily with a small nose-plow attachment and so are able to cut their way through otherwise impassable snow.

In sections where the snow conditions are severe the rotary snow plow is much to be desired. This type of plow has a large pan in front with spreading wings to collect the snow as it is driven forward. Within the so-called pan is a revolving wheel fitted with blades or fans which cut the snow and, carrying it upward, throw it a considerable distance to the side.

The movement of cars through snow soon forms a crust which becomes harder as the motor cases continue to drag on it. This hard center not only checks the speed of the cars but causes a loss of power in proportion to the extent to which the cases ride on it. This condition becomes at once apparent if a car having smaller diameter wheels than others is run over the line. When this car comes to the hard centers it soon stops and efforts to move it result only in spinning the wheels. Upon examination it is found that the motor cases are riding on the crust of snow and raising the wheels from the rails, destroying the tractive effort. To remove this hard center we have the scraper and flanger, which is usually lowered and raised by compressed air. In some cases steel points arranged in the form of a tooth harrow are used successfully to break down the hard center.

In congested terminals and streets where the snow can no longer be pushed aside it becomes necessary to load it in wagons or cars and haul it to the most convenient place for unloading.

Snowstorms vary in intensity and in kind, and it is hardly possible to depend upon a single type of snow plow or sweeper to overcome them all. Certain types of plows are better adapted to control certain storms.

SNOW-FIGHTING ORGANIZATIONS

To have at our command any or all of the above-mentioned snow-fighting devices is not alone sufficient; there must be an organization. This organization should be carefully planned in advance and the men included therein should be fully instructed and trained so as to avoid confusion or misunderstanding when the emergency arises. Men trained to a particular work of this kind should be kept at it if possible, as experience is a valuable asset. The men should be instructed to report for duty immediately upon the first snowfall and be ready to take charge of the work allotted to them. The superintendent or officer in charge should be where reports of progress or difficulty can reach him promptly so that he can act in accordance therewith with precision. The metropolitan fireman is always ready; the sounding of the alarm immediately puts him into action, and he is on his way fully aware that a few minutes saved in the early stages of a fire may mean the prevention of great loss. The same inspiration should apply to the railroad snow-fighting organization. Start the fight with the appearance of the storm. Do not wait until reports come in that the cars have been stopped.

It is also important that the equipment be thoroughly overhauled and put in condition for immediate service at the beginning of winter. When the threatened danger has made its appearance there is no time for repairs or the purchase of shovels and brooms. A contest against the storms of winter is war, so let us follow the adage "In time of peace prepare for war."

Brushes

An Analysis of the Requirements of the Satisfactory Brush for Railway Service

BY W. C. KALB, NATIONAL CARBON COMPANY, CLEVELAND, OHIO

A brush on an electrical machine has two distinct functions. First, it must carry the current to and from the commutator or slip rings of the revolving part. In the case of a.c. machines where the brush operates on slip rings this is the only function, but in d.c. machines or a.c. motors of the commutating type a second demand is made, that of preventing destructive currents in the armature coil short-circuited by the brush and suppressing sparking when this short circuit is broken.

REASONS FOR USING CARBON BRUSHES

Carbon brushes have several distinct advantages over metallic brushes and have practically displaced them entirely on commutating machines. Metallic brushes have a very low contact resistance, and, unless there is some automatic device to shift them to the neutral point as the load varies, the current in the short-circuited coil would reach a very high value and destructive sparking would be the result. Such a device has been used on some machines, but it is a makeshift at best, and on a railway motor would be entirely inapplicable. The relatively high conductivity and high contact resistance of carbon brushes solve this difficulty. They limit the current in the short-circuited coil and avoid the excessive heat losses which would otherwise result. Furthermore, this limitation of the short-circuit current greatly reduces sparking, and if kept so low that the voltage drop across the contact is below a certain critical value sparking will be entirely suppressed. This value has been estimated at about 4 volts for average conditions of railway motor design and carbon brushes of usual characteristics. The fact that carbon does not support an arc as well as metal is another factor in favor of its use. Still other reasons are that it does not melt or burn at the edges when subjected to high temperature, nor is its quality affected in any way until the glowing point is reached. It does not cause excessive wear of commutators, which is a fault of metal brushes, unless they are given the most careful attention. Finally, the life of the brush itself is much longer than that of any form of metallic brush.

EFFECTS OF SPARKING

One of the greatest sources of commutator and brush troubles is sparking. The intense heat generated at the point where the sparking occurs burns the copper and forms a black coating of copper oxide on the commutator surface. This burning action leads to much more serious difficulties. The rough, black commutator surface greatly raises the resistance of brush contact and increases the heat losses of the motor. It also causes excessive wear on the brushes. The burning action of sparking on the copper segments will be greater when sparking is very severe than the wear on the mica insulation, and "high mica" will result. The projecting mica causes a large amount of brush breakage; it makes the brush chatter badly, intensifying sparking; it may even prevent the brush coming in contact with the copper so that the current passes continuously between brush and commutator in the form af an arc. When this condition is reached a flash-over is the inevitable result.

Flat spots are another form of trouble resulting more or less directly from sparking, although sometimes caused by soft copper or hard mica, or by the rush of current due to starting a car quickly on grades, or to starting with brakes partially set.

Dirty commutator, high mica and flat spots are troubles which are closely related, and if one is not remedied the others will soon appear. All are sources of serious damage to the commutator, and unless the causes are removed or efficient remedies applied the commutator must be turned frequently. The resulting short life of the commutator and the labor cost of frequent overhauling may become a very large item of maintenance. Furthermore, the heat losses resulting from any of these troubles are large and will either limit the capacity of the motor or result in overheated machines and the accompanying difficulties.

SLOTTED COMMUTATORS AND ABRASIVE BRUSHES

Two remedies have been applied to the conditions described above. They are slotting the commutators and the use of a brush possessing abrasive properties. The abrasive brush keeps the mica worn down even with the copper and preserves a smooth, clean contact between brush and commutator. The objection is that it is impossible to select a brush of exactly the right abrasiveness to wear the mica at a rate to match the burning of the copper. If not sufficiently abrasive, the troubles described will eventually develop; if too abrasive, excessive commutator wear will result. However, there are some motors on which sparking is so severe either because of design or conditions of service that no other remedy can be successfully applied.

So much has been said in the technical press in regard to the use of slotted commutators and the methods of performing this work that space will not be taken here to discuss the subject. Slotting of the commutator does not prevent burning of the copper from the heat of sparking, but prevents the troubles arising therefrom by removing the deposit as fast as it is formed. When used with judgment the practice is undoubtedly beneficial. The abrasive brush should never be employed on slotted commutators, as they soon wear the copper down to the mica and necessitate reslotting. Brushes treated with a lubricating substance are not to be recommended, as they tend to gum up the slots and cause short circuits and flashes. Brushes that are too soft to prevent the accumulation of deposit on the commutator surface should be avoided, although there is not the opportunity for trouble from such cause that there would be on unslotted commutators. What is needed then is a non-abrasive brush of sufficient hardness to keep the commutator clean and give it a glossy surface. With the proper selection of brush it will be found that commutator wear has been practically eliminated and that flat spots, black commutators, high mica and flash-overs have been prevented. In some cases, however, slotted commutators do not give satisfaction. One street railway company slotted the commutators of some of its motors, but the plan was a failure because the company did not keep oil from working into the frame and on to the commutator. Cleanliness, always important, becomes increasingly so when commutators are slotted. If oil and dust get on the commutator, the slots will be gummed up and short circuits are sure to result. It is well at each inspection to blow all dust and deposit from the slots by a jet of compressed air.

DISTINCTION BETWEEN HARDNESS AND ABRASIVENESS

In this connection it may be well to point out the distinction between hardness and abrasiveness, terms which are frequently confused in speaking of brushes. The hardness of a brush depends upon the hardness of the particles composing it and also on the strength of the binder holding these particles together, while abrasiveness refers to the cutting or grinding properties of the brush, whether hard or soft. In fact, a soft brush may wear a commutator faster than a hard one containing the same percentage of abrasive material because these particles become loosened

in the softer brush and have a grinding action which the particles do not possess when firmly imbedded. On the other hand, a hard, non-abrasive brush will take a smooth, glossy face and smooth off irregularities on the commutator surface, but beyond that cause practically no wear.

USE OF NON-ABRASIVE BRUSHES ON NON-SLOTTED COMMUTATORS

It has been pointed out in an earlier paragraph that sparking conditions on a motor are sometimes so severe that slotting the commutator is ineffective and the use of an abrasive brush the best practice. On the other hand, in the more modern designs of railway motors, especially those of large horse-power, the problems of sparking have been so well handled in the design that neither an abrasive brush nor slotting of commutator is necessary. This is especially true of motors where the tendency to spark is counterbalanced by the use of auxiliary poles. However, these are usually slotted when sent out by the manufacturer, merely as an additional measure of precaution.

CHATTERING

The difficulties arising from sparking and the ways in which they have been met and overcome have been described. With the introduction of the high speeds encountered in electric traction of the present day a new difficulty of almost equal seriousness arose. This is chattering of commutator depreciation will far overshadow the cost of brushes. One master mechanic has reported that every time one of his large motors came in to have the commutator turned because of flat spots it cost, in labor, idle investment and decrease in size of commutator, over $15. This was being done frequently, in fact, as often as every three months. By using a brush suited to his conditions these flat spots have been eliminated, and commutators are never turned unless trouble has been started by a short or open circuit. Fifteen dollars in three months far overshadows the cost of a three months' supply of brushes for one motor. As a matter of fact, the brush cost was reduced in this case, although a brush of three times the former price was adopted. The trouble had been due to chattering, and where brushes formerly broke after one day to two weeks' service they now run six to eight months. The above illustration from actual service will show that economy lies in using the brush best suited to operating conditions, whether the cost of the individual brush is high or low.

DEFECTS IN MOTOR OR BRUSHES

A great deal of trouble which is laid to brushes may be traced to defects in the motor which, in many cases, are easily remedied. One trouble frequently encountered is the escape of oil from the bearings into the frame of the motor,

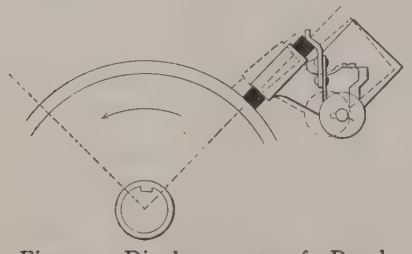


Fig. 1—Displacement of Brush Holder Due to Loose Holder

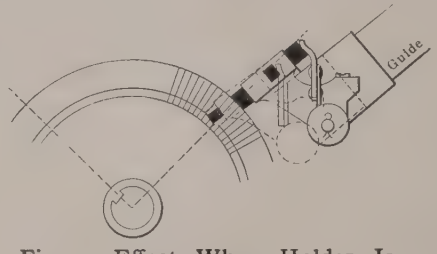


Fig. 2—Effect When Holder Is Not Radial

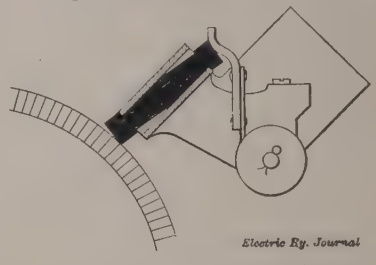


Fig. 3—Effect of Large Holder or Thin Brush in Double-End Operation

the brushes. Probably its most frequent cause is a lack of lubricating property in the brush. If the moistened finger should be rubbed across a pane of glass its motion will become a series of short rapid jumps. A similar action takes place when a brush with insufficient lubrication bears on a rapidly revolving commutator. Flat spots will also cause severe chattering of the brushes when a motor is running at high speed. With uneven track, cross-overs and bad rail joints jars are encountered that may cause the brushes to jump from the commutator unless the tension is heavy. All of these sources of chattering increase in effect with the speed, and it may become very serious when the peripheral speed of the commutator is high.

One effect of chattering is severe chipping and breakage of brushes. Modern improvements have produced a brush which will stand a great deal of this vibration and hammering action, but in time it will break down unless the cause of the trouble is removed. The fact that the brush breaks contact with the commutator produces sparking of great severity, resulting in all the troubles previously described as arising from this source.

Chattering may be prevented by keeping the commutator free from flat spots or high mica, maintaining all motor parts, especially the brush holders, in proper alignment and firmly in place, maintaining the proper tension on the brushes, and selecting a brush with sufficient lubrication to run smoothly on the commutator at the highest speed attained.

ECONOMY IN USE OF BEST BRUSH

Commutator and brush troubles, if allowed to go on without correction, become a very large item of cost in the maintenance of electric railway equipment. Commutators are expensive, and if these troubles that have been described are allowed to go on unchecked the increase in

where it finds its way to the commutator, brushes and holders. It carbonizes on the commutator, giving it a black, rough surface, and gums up the brushes so that they stick in the holders and do not bear with full tension on the commutator. This defect should be very carefully guarded against. Some of the most troublesome defects in railway motors are encountered in the brush holders, and a few of these will be illustrated by sketches. Fig. 1 illustrates the effect of a loose brush holder. With the armature in motion the brush is shifted from the neutral in the direction of rotation. It is well known that brushes on a motor should be shifted from the mechanical neutral against the direction of rotation to keep them in a position of no sparking as the load comes on, and so it is apparent that the effect of the loose holder is to make sparking more severe, as it causes a shifting of the brush in the opposite direction. Fig. 2 illustrates a similar displacement due to the fact that the guide to which the holder is clamped is not radial. The solid lines show the position with a full-sized commutator, where it is assumed that the brush bears at the neutral point. The dotted lines show the displacement when the holder has been moved down the guides to accommodate a commutator of smaller diameter. When the brush holder is worn too large or too thin a brush is used serious trouble will result. There is a displacement of the brush from the neutral position, as in the case of a loose holder, resulting in increased sparking; but, in addition, serious wear and breakage of the brush arise, especially where the car is operated in both directions. This is illustrated in Fig. 3. The minimum amount of play a brush can have and not stick in the holder depends on the maintenance. Under good conditions 0.005 in. is sufficient, and it may even be less when the brush and holder are kept perfectly clean. About 1-64 in. is the maximum. Thin brushes

decrease the area of brush contact surface and increase the heating of the motor.

A copper coating does no good on railway motor brushes, and often does harm, for it soon wears off and makes the brush loose in the holder. It is also liable to peel, especially with graphite brushes, and wedge the brush in the holder. The copper coating extends to ¼ in. of the bearing surface of the brush, and when the brush is worn down so that the copper touches the commutator the sparking will melt it into globular form. These globules on the side of the brush will prevent it being removed from the holder. Copper coating should be specified for railway motor brushes only when clamp pigtails are used.

Fig. 4 illustrates another faulty practice that is frequently encountered. It is the use of a brush longer than standard or a spring of improper shape, and results in the application of the pressure at the corner of the brush instead of directly on the top. The brush wears as illustrated, and the shoulder so formed holds the brush from making firm contact with the commutator. Dirty commutator, sparking and flashes are the result.

The path of the hammer of a brush holder is spiral and not circular, and it is designed so that the pressure will be exerted on the center of the brush throughout its range of wear. For this reason the pressure is not thrown on the edge of the brush as it is worn short. The proper length of brush to be used is purely a matter of design. The brush holders should be kept from ¼ in. to ⅜ in. away from the surface of the commutator, otherwise extra play will result and the chances for breakage will be considerably increased. No definite rule can be given for the number of commutator bars a brush should cover, since this is purely a matter of design. In most cases it is between two and three.

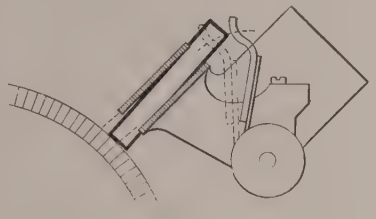


Fig. 4—Effect of Brush Longer Than Standard or Spring Too Short

The tension of brush holder springs should receive careful attention. If too light, brushes will chatter under the ordinary jars of service and will not be able to keep the commutator surface polished. If too heavy, excessive wear of both commutator and brushes will result and the friction loss will be high. For every road the best value should be determined by experiment, and this value maintained. No general value can be given, as it is dependent to a considerable extent on operating conditions; 4 lb. to 7 lb. per square inch will cover the ordinary range of service. Brush pressure may be measured by means of a small spring balance such as can be obtained at any sporting goods store.

Sometimes a grade of brush can be found to counteract the troubles arising from motor defects, and it is adopted for this reason. Such a course is wrong, for it is usually accompanied by the sacrifice of other desirable brush characteristics and can never be truly economical. The proper method is first to remedy the faults in the machine, then select a brush best suited to operating conditions. It is only in this manner that the greatest economy in maintenance can be attained.

CARRYING CAPACITY

It would be well at this point to give a brief discussion of the subject of "carrying capacity," in regard to which there is considerable misunderstanding. The carrying capacity of an electrical conductor is the maximum current density allowable for a certain predetermined temperature rise. In a brush it is subject to influence from the specific and contact resistance, coefficient of friction and thermal conductivity of the brush itself as well as from the thermal conductivity of parts in contact with the brush and the ventilation of the machine. It can readily be seen that such a figure can have only a relative value, as it would differ for the same brush on almost any two machines on which the brush might be placed and for the same grade in different sizes due to different radiating surface. Two values are usually given, one for railway motor service and one for generator and stationary motor service. The former is the higher, inasmuch as higher temperatures are allowable. These values represent the allowable current density for the rated temperature rise on a machine of average design. They are subject to variation with conditions of design and operation.

SELECTION OF BRUSH TO SUIT OPERATING CONDITIONS

The selection of a brush for a given service involves a very careful analysis of the conditions and the proper estimate of the relative value of each. It is not always possible to secure a brush having such a combination of characteristics as to meet all conditions of service in the best possible manner. In such case one must decide which are the more important and make his choice accordingly, then meet the conditions which remain as best he may. This involves such a wide knowledge and experience that the most satisfactory way is to select two or three grades of brushes which possess what appear to be the most suitable combinations of characteristics and, by a service test, make a final selection from these. When a grade of brushes is being tested in this way, all of the brushes on the motor or generator should be of the kind under test and not simply one or two, because if the contact resistance of the new brushes is different from that of the old they will not carry their proper proportion of the load.

STATIONARY MACHINES

Generators, rotary converters and stationary motors are open to many defects of design and construction which result in sparking and allied troubles that are often charged to the brushes.

The principles of commutation are the same, of course, as on railway motors, but the brushes, instead of being fixed in a central position, may be shifted to the position of least sparking for the load being carried. On well-designed machines, with properly selected brushes, no sparking should be visible. Under the worst condition it should never be severe, and for this reason as well as for the high cost of commutators an abrasive brush should never be necessary for this class of machines. It is seldom necessary to slot the commutator on stationary machines, but in some cases where sparking is present and there is a tendency toward high mica slotting is advantageous. It need be only 1-64 in. to 1-32 in. deep, as the wear on these commutators is very slight under proper operating conditions.

The commutators of most large generators and rotary converters will be found to have rather high peripheral speed, and the lubricating properties of the brush employed must be good, or chattering, with its accompanying noise and damage to the commutator, will result. The angle of the brush to the commutator has much to do with its tendency to chatter. If at an angle opposed to the direction of rotation, the tendency to chatter is usually greater than if the brush is inclined in a trailing position. Frequently commutator troubles and noisy operation may be overcome without a change of brushes merely by a reversal of the brush holders from an opposed to a trailing position on the commutator.

The application of a lubricating substance to the commutator may not be objectionable provided it is used with judgment and in very moderate quantity so that it will not gather on the brushes or parts of the machine. It is of assistance in securing quiet operation and generally increases the contact resistance between brushes and commutator to some extent. If there is a tendency to spark, this latter effect is of advantage; otherwise it results in an in-

crease of heat losses. If lubrication is used in sufficient quantity to gather on the brushes, it is almost certain to cause glowing honeycombing of the brush faces, and for this reason it is not recommended. Cleanliness is an important point to be observed about power-generating machinery. A great deal of brush and commutator trouble will be avoided if the machines are kept free from an accumulation of dust and oil. All parts where oil and grease tend to gather should be wiped carefully at least once a day, and a supply of compressed air of sufficient pressure should be available for blowing the dust from the machine. Careful cleaning of the machine and brushes is absolutely necessary after sandpaper has been used on the commutator. Otherwise fine copper will gather on the brush faces, causing them to pit and honeycomb, and frequently will become firmly enough embedded to scratch the commutator seriously.

TROUBLES

If the brush holder studs are unequally spaced about the commutator, it will be impossible to set all the brushes in the best commutating position. Most machines are so designed as to allow some adjustment in this direction, and where this is the case care should be taken to correct this fault if it exists. Weak fields are another source of commutation trouble, due to unequal distribution of the magnetic flux. A very narrow neutral point or a brush which covers too many commutator bars will give a limited range of position for proper commutation and will make a very sensitive machine. Worn bearings, rough commutator, high or low commutator bars and poorly laced belts are other machine defects causing troubles that are frequently charged to the brushes.

CONCLUSION

Much of the foregoing discussion has had a direct bearing only on railway service and motors of the railway type. It is with them that the most severe conditions are encountered and the hardest problems are presented for solution. However, stationary machines are subject to the same fundamental laws, and many of the lessons learned in the severe school of railway service can be successfully applied to the operation of generators, rotary converters and stationary motors.

CONVENTION MATTERS

Secretary Donecker has made public the following program of the meetings of the American Electric Railway Association. All sessions of this association will be held in the Blue Room of the Saddle and Sirloin Club, and all sessions will be open sessions:

Tuesday, Oct. 8
9:30 a. m.—12:30 p. m.

Registration and badges, Convention Hall.

Tuesday, Oct. 8
2 p. m.—5 p. m.

Convention called to order.
Annual address of the president.
Annual report of the executive committee.
Annual report of the secretary-treasurer.
Announcements.
New business.
Reports of committees:

(a) Subjects, C. Loomis Allen, chairman, president Newport News & Old Point Railway & Electric Company, Syracuse, N. Y.
(b) Company membership, C. Loomis Allen, chairman, president Newport News & Old Point Railway & Electric Company, Syracuse, N. Y.
(c) Membership (associate), James F. Shaw, chairman, New York, N. Y.
(d) Education, H. H. Norris, chairman, professor electrical engineering, Cornell University, Ithaca, N. Y.

Address—"The Future of the Interurban," by Randal Morgan, first vice-president and general counsel United Gas Improvement Company, Philadelphia, Pa.

Address—"Water-Power Development and Its Relation to Public Utilities," by a representative of H. M. Byllesby & Company, Chicago, Ill.

Wednesday, Oct. 9
2 p. m.—5 p. m.

Appointment of nominating committee.
Reports of committees:

(a) Insurance, H. J. Davies, chairman, secretary The Cleveland Railway Company, Cleveland, Ohio.
(b) Special committees:
  Recommendations in outgoing president's address, C. N. Duffy, chairman, vice-president The Milwaukee Electric Railway & Light Company, Milwaukee, Wis.
  Company Sections, C. N. Duffy, chairman, vice-president The Milwaukee Electric Railway & Light Company, Milwaukee, Wis.
  Aera advisory, Arthur W. Brady, chairman, president Union Traction Company of Indiana, Anderson, Ind.
  Constitution and by-laws, C. S. Sergeant, chairman, vice-president Boston Elevated Railway Company, Boston, Mass.
  Relations with sectional associations, C. L. Henry, chairman, president Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.
(c) Public relations, Arthur W. Brady, chairman, president Union Traction Company of Indiana, Anderson, Ind.

Address—"A Policy of Publicity," by Arthur Warren, New York, N. Y.

Report of committee on welfare of employees, J. J. Burleigh, chairman, second vice-president Public Service Railway Company, Newark, N. J.

Address—"Arbitration in Australia," by J. S. Badger, general manager Brisbane Tramway Company, Brisbane, Queensland, Australia.

Address—"The Milwaukee Fare Case," by R. B. Stearns, vice-president The Milwaukee Electric Railway & Light Company, Milwaukee, Wis.

Thursday, Oct. 10
2 p. m.—5 p. m.

Reports of committees:

(a) Compensation for carrying United States mail, T. H. Tutwiler, chairman, president Memphis Street Railway Company, Memphis, Tenn.
(b) Taxation matters, C. L. S. Tingley, chairman, second vice-president American Railways Company, Philadelphia, Pa.
(c) Federal relations, George H. Harries, chairman, president The Arkansas Valley Railway, Light & Power Company, Louisville, Ky.
(d) Joint use of poles, W. J. Harvie, chairman, railway manager J. G. White & Company, New York, N. Y.
(e) Determining the proper basis for rates and fares, Frank R. Ford, chairman, Ford, Bacon & Davis, New York, N. Y.

Address—"Electric Railway Securities," by Morrell W. Gaines, statistician, Brown Brothers & Company, New York, N. Y.

Address—"Automatic Rate Regulations," by Oscar T. Crosby, president Wilmington & Philadelphia Traction Company, Wilmington, Del., president Trenton & Mercer County Traction Corporation, Trenton N. J.

Report of the committee on nominations.
Election of officers.
Installation of officers.
Resolutions.

Unfinished business.
Adjournment.

CHANGES IN PROGRAMS OF AFFILIATED ASSOCIATIONS

The preliminary programs of the Accountants', Engineering, Claim Agents' and Transportation & Traffic associations were published in the issue of this paper for Sept. 14. The following additions are announced:

In the Accountants' convention the title of the address to be presented on Monday afternoon by Prof. Mortimer E. Cooley, dean department of engineering, University of Michigan, is "Overhead Charges." The subject which will be discussed in an address Tuesday morning by W. J. Hagenah, public utility statistician, Chicago, is "Intangible Values of Electric Railways and Their Determination from Accounts."

In the Claim Agents' convention the report of the committee on safety league has been scheduled for Thursday morning to follow immediately the joint session of the Claim Agents and the Transportation & Traffic associations.

In the Transportation & Traffic convention the report of the committee on passenger traffic will be presented on Thursday morning just after the appointment of the nominating committee.

SPECIAL TRAINS

The special train to Chicago which has been arranged to leave New York over the New York Central lines at 2 p. m. Saturday, Oct. 5, is scheduled to arrive in Chicago at 11:30 a. m. Sunday, Oct. 6. It will consist of one eight-stateroom observation car, two seven-stateroom double drawing-room cars, one ten-stateroom car, one seven-drawing-room car, three sixteen-section cars, two twelve-section drawing-room standard cars, one large library smoking or club car and two large dining cars. The New England delegates will leave Boston in two special cars via the Boston & Albany Railroad at 11:30 a. m. on Saturday, Oct. 5, joining the New York Central special at Albany. The transportation committee has secured applications for over 150 persons and a special committee will take care of the entertainment features.

The committee in charge of the New York-Chicago special train over the Pennsylvania Railroad reports that to date reservations have been received for 160 persons, most of whom are from New York City and the metropolitan district. The Public Service Railway alone has engaged one car and a half to accommodate its delegation. The railway companies in Pennsylvania are sending large contingents, and all arrangements are practically complete for an enjoyable and pleasant trip to the convention city. Those who have forwarded their remittances covering their reservations will receive their tickets direct from the Pennsylvania Railroad on or before Oct. 1. The committee adds a plea that those receiving communications from the passenger department of the Pennsylvania Railroad in regard to their tickets, reservations, etc., should reply promptly so as to facilitate the final bookings.

There will be a large delegation to Chicago from Los Angeles and southern California. The train will consist of two Pullman sleeping cars, a combination drawing room and sleeping car and compartment observation car. The party expects to arrive in Chicago on the morning of Oct. 6.

The chairmen of transportation from other sections of the country report a number of reservations, but as yet are not prepared to report the exact composition of the trains or the number of special cars.

An enterprising New York hatter has taken advantage of the interest shown by the public in the New York double-deck car and has adapted the idea to his advertising campaign. The chassis of an auto has been mounted with a canvas body designed and painted to represent the double-deck car and is being run over the same route as that traversed by the bona-fide car.

ACCIDENT PREVENTION ON THE LINES OF THE AMERICAN ELECTRIC RAILWAY ASSOCIATION*

BY H. K. BENNETT, PRESIDENT CLAIM AGENTS' ASSOCIATION

The time was, and not so very long ago, when a claim agent meant a person who, after an accident, went out with all the information he could gather to make what seemed to him the best settlement, as far as dollars and cents were concerned, with the injured person. If he was successful in minimizing or reducing the amount he had previously paid in similar cases, he congratulated himself. If he paid more than had been anticipated, he reflected that if the sum were not paid then his company might be obliged to pay more later on, and usually he managed to even up matters in the settlement of the next claim. To-day the claim agent has become a "doctor of prevention," and woe betide the claim department whose sole object is to settle claims and not to prevent the necessity for such settlement.

When a certain claim agent, in 1907, was asked whether he "preferred to be a claim agent of to-day or an advance agent in a preventive capacity for to-morrow," he was nonplused, because up to that time the word "prevention" had never been emphasized at any of the conventions. To-day this same man, with others, is living in the atmosphere of "prevention," and if he could have the fulfilment of his personal desires, he would see that every railway, large and small, had one man whose sole object in life would be to spread the gospel of prevention in every legitimate way.

Prevention is not a theory. There are a thousand and one ways in which this doctrine may be carried out. In no better way, perhaps, can the start be made than by having someone connected with the claim department place before the new trainmen the practical side of railroading.

Ordinarily, the claim agent has been a trainman himself and is thoroughly conversant with all of the departments and with the operation of cars. He knows—or should know—the weaknesses and frailty of the human mind. He must study each man who comes before him with a great degree of care, proceeding along lines most applicable to the individual to be instructed. What might be very illuminating to one man, couched in elegant words and picturesque descriptions, to the next man might be absolutely unintelligible and barren of results. A claim agent must know the defects in the entire system over which his company operates. He should know the points of congestion, the places where accidents have happened and the cause of each accident, and he should guard against their repetition, in order that he may intelligently instruct the man who has just been engaged as the driver or conductor of an electric car.

The claim agent should and must appeal to a man's intuition and thoughtfulness, impressing upon him the duty of thinking for the unthinking men, women or children who heedlessly and without regard to consequences place themselves in dangerous situations where they may suffer injury due to their own negligence.

The motorman must be told, in plain language, that he must use care in connection with vehicles going in the same general direction and using a portion of the tracks, and that he must under no circumstances speed his car up to the vehicle simply to see how near he can come to it and not hit it. He must assume that the driver of the vehicle is either deaf or asleep, or that his mind is absolutely removed from anything that is occurring about him, and that, in this lethargic state, he will probably do the very thing he should not do. In other words, if he is driving carelessly or allowing his reins to dangle, he will instinctively clutch for them, and ninety-nine times out of a hundred he will seize the wrong rein, pulling his horse and vehicle onto the track instead of away from it.

*Abstract of a paper prepared for the International Congress on Accident Prevention and Industrial Hygiene, Milan, May 29, 1912, and presented through the American Museum of Safety, New York.

Therefore the motorman must supply intelligence for many of those with whom he daily comes in contact. You will say that this is impossible, that you cannot find a sufficient number of men willing to run electric cars who are capable of acting as mentors to the general public; but this is being done wherever public service lines are operated.

Trainmen are being instructed that it is their duty to overcome the spirit of antagonism against public corporation service. The platform man, by his rudeness, often leads the public to believe that his conduct is representative of the attitude of his employers. On the other hand, by his toleration, helpfulness and courtesy he may so influence the minds of the traveling public that they will no longer look upon a railway company with ready suspicion.

The claim agent should be always on the watch for defects in equipment, broken and loose rails, broken wires, damaged steps, broken seats, loose screw heads and the thousand and one things that detract from perfect equipment. There should be a thorough and conclusive understanding between the claim agent and the mechanical and operating department of the railway system.

The prevention of acidents has brought into the field another phase of the question which is comparatively new. This is the education of the general public through the public schools. A claim agent of one of the largest railways on the Pacific Coast, Frederick S. Hughes, conceived the idea of showing by means of short, illustrated talks to school children why so many children have been injured. These children have been enrolled in a great band known as the "Public Safety League," and there are now many thousands of children on the Pacific Coast wearing the blue button of "Safety." How many lives have been saved and how many accidents prevented is not a question of theory. The statistics have been worked out to show that the percentage of accidents has been reduced to such an extent as to appear almost unbelievable.

Photographs are taken showing how accidents occur, and these are flashed upon the lecture screens of the various schools. In this way object lessons are most forcibly impressed upon the minds of the children. Each child becomes a missionary for the doctrine of prevention and goes out to use thought and discretion, not only for himself or herself, but also for the younger brother or sister who is unable to know the right thing to be done.

This method of education has already had its effect in a jury room. In a very recent trial, where the jury stood eleven to one in favor of paying the plaintiff a large amount of damages, the twelfth man said, "Gentlemen, the company which sends a man into the schools and tells my boy or girl how to avoid accidents from automobiles, electric cars and vehicles cannot be such a bad company after all." Whereupon one of the eleven remarked, "My boy came home with one of those buttons on the other day." Immediately the jury session changed into an "experience" meeting, with the result that, instead of the large sum which was about to be awarded the plaintiff, a sum commensurate with the injuries, and even less than the company had been willing to give in settlement, was agreed upon.

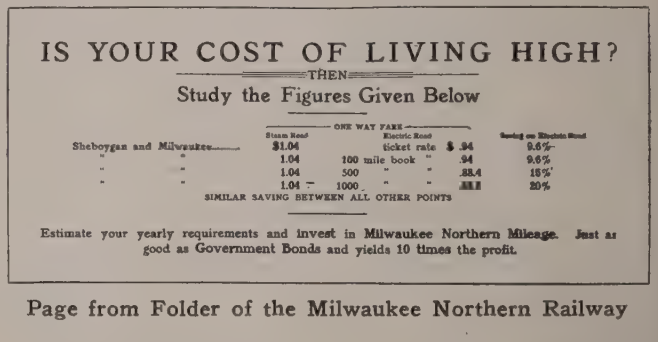
The Public Service Railway of New Jersey has secured the services of Mr. Hughes and is now following the same plan for the education of the school children of that State in the matter of safety. Other states are taking up this work, and before long it is hoped that the blue button of "Safety" will be worn by school children from coast to coast.

In connection with the subject of accident prevention, we heartily indorse the aims and work of the American Museum of Safety and the museums of safety in other countries. To these and all associations engaged in spreading the humanitarian gospel of prevention and the conservation of human life and efficiency generous, intelligent co-operation should be pledged by master and man, employer and employed, as well as by the general public.

ADVERTISING THE MILWAUKEE NORTHERN RAILWAY

A folder issued by the Milwaukee Northern Railway contains schedules of the limited and local trains operated between Milwaukee and Sheboygan, Wis., and other information relating to the property. The low passenger rates charged by the company in comparison with the steam railway rates between competing points are set forth in an advertisement which also directs attention to the saving that may be made in the cost of living by the purchase of mileage on the Milwaukee Northern Railway. This page of the folder is reproduced herewith.

On another page of the folder it is stated that fourteen limited trains are operated daily between the heart of Milwaukee and the heart of Sheboygan. The running time is two hours and five minutes, and limited trains are operated every two hours during the day. The booklet says that more limited trains are operated by the company than on all of the other electric railways in the State combined. In addition to the limited trains, local trains are operated and make all regular stops when required in addition to the usual station stops. On one page attention is also called to the fishing, hunting, boating and skating found on the lines of the company in the different seasons of the year.



IS YOUR COST OF LIVING HIGH?

THEN

Study the Figures Given Below

	ONE WAY FARE — Steam Road		Electric Road	Saving on Electric Road
Sheboygan and Milwaukee	$1.04		ticket rate $ .94	9.6%
" "	1.04	100 mile book "	.94	9.6%
" "	1.04	500 " "	.83.4	18%
" "	1.04 —	1000 " "	.83.1	20%

SIMILAR SAVING BETWEEN ALL OTHER POINTS

Estimate your yearly requirements and invest in Milwaukee Northern Mileage. Just as good as Government Bonds and yields 10 times the profit.

Page from Folder of the Milwaukee Northern Railway

Through tickets are issued by the company in connection with the Chicago & Milwaukee Electric Railroad and also for any point on the line of the Sheboygan Railway & Electric Company between Sheboygan and Elkhart Lake.

Chartered cars are furnished for trips. Excursion tickets in lots of fifty or more are issued at a reduced rate.

A special notice in the folder relates to the Milwaukee city line operated by the company. This line is operated between Fifth and Wells Streets, Milwaukee, and the north side, Atkinson Avenue and Lindwurm Park. The cash fare is 5 cents and eight tickets are issued for 25 cents. Transfers are exchanged with the Milwaukee city line of the Chicago & Milwaukee Electric Railway. The rule as to fares for children on the city line is the same as on the interurban line of the Milwaukee Northern Railway.

Local express matter is handled on all interurban trains and express shipments may be made to distant points by United States Express. All express matter is collected and delivered at all stations. The company advertises that trunks will be called for and delivered at all stations at reasonable rates. Packages are handled on all trains. The folder in referring to the express service, says: "Remember, express is forwarded every hour." In explanation of this schedule the following notice was issued by F. W. Walker, general manager of the company:

"For the successful operation of the service proposed to be rendered the co-operation of the traveling public is most essential and the company respectfully solicits such co-operation and especially requests that passengers board the proper trains, thus avoiding confusion and delay.

"If the schedules are not thoroughly understood, all agents will gladly give such explanations as are desired.

"We again respectfully solicit the co-operation of our patrons and request that complaints be made in writing to the company at Cedarburg, Wis."

New Signal System of Washington, Baltimore & Annapolis Railroad

The Features of This Installation Are the Omission of Track-Circuit Preliminaries and Consequent Simplification of Apparatus and Operating Rules

The Washington, Baltimore & Annapolis Electric Railroad connects the three cities named by a high-speed 1200-volt d.c. trolley line having a double-track road between Baltimore and Washington and a single-track line from a point called Annapolis Junction, where it connects with the Baltimore & Ohio Railroad, to Annapolis. This single-track line is 20 miles in length, and the eastern division, or that portion from Naval Academy Junction to Annapolis, a distance of 13.2 miles, was equipped with automatic block signals just preceding the Democratic convention of this year. A record for the quick installation of a complete system of automatic signaling protection was established, as the signals were in service thirty days after the first shipment of material and forty-nine days after the award of the contract.

The traffic over this road is passenger, local freight and through freight. Passenger service is usually provided by single cars, but trains are also run. A shuttle, or city, service is also maintained between Annapolis and Camp Parole. On special occasions regular steam trains of the Baltimore & Ohio Railroad and the Pennsylvania Railroad convey over this signaled track a large number of passengers to Naval Academy exercises at Annapolis. This section was built about 1836 and retains the many original curves, almost all of which, being in cuts, allow only a short view of the road.

The layout of tracks and signals, with the signal controlling limits, is shown in the line diagram. There are four stub sidings and three double-ended sidings on this line, one of which, "Best Gate," is a regular meeting point for scheduled cars. At this siding the switches are set for all cars to take the right-hand track and trail through the exit switch. At other double-ended sidings cars proceed at speed on the main line if they have no meets. Whenever possible these double-ended sidings are used for meets with long freight trains.

The signal installation comprises 13.2 miles of protected track, eight standard single track blocks and one special block (Best Gate), seventeen semaphore signals and sixteen light signals. The longest block is 11,610 ft. and the shortest 5,430 ft., an average of 8,680 ft.

The signaling is controlled by continuous track circuits, which insures the signals remaining in the danger position so long as the block which they govern is occupied, and each car is fully protected in the rear as well as head on; that is to say, but one car is allowed in a block at any one time.

GENERAL DESIGN OF SIGNAL SYSTEM

There has been a departure from the usual arrangement for single-track automatic signals in this installation. Generally there is a track circuit preliminary at one or both ends of the block in order to prevent two opposing cars from simultaneously entering a block under clear signals. This, under normal conditions, operates perfectly, but with a deranged schedule on an interurban road it may cause either further delay to a car already late or require additional signals or indicators at the entrance to the preliminary to minimize such delay. A discussion of the function and disadvantages of preliminaries formed part of the 1911 report of the block signal committee of the American Electric Railway Engineering Association, and the conclusion was reached that the elimination of preliminaries is unquestionably desirable if the substitute does not introduce unsafe or undesirable features. Therefore in this installation an attempt was made by the manufacturers of the signal system, the Union Switch & Signal Company, to design an arrangement in which their necessity should be removed. Instead of preliminaries, the plan followed employs two signals of the light type, with signals of the semaphore type located at the ends of the block.

This being the first installation of its kind, a detailed description will probably be of interest.

W., B. & A. Signals—Proceed and Stop Semaphore Signals

Five-Inch Lens Light Signal

SPACING OF SIGNALS

Each signal is numbered according to the miles and nearest tenth from Annapolis. East-bound signal numbers end in an odd tenth because east-bound trains are odd-numbered, whereas west-bound signal numbers end in an even tenth for the same reason.

The blocks extend from siding to siding and each has four signals, two of which are semaphores with one located at each end of the block, the other two being light signals, each about 1000 ft. or more in advance of the semaphore signals. Referring to the diagram, the block between Gambrills and Millersville has semaphore signals No. 115, east-bound, moving to the right on the diagram, and No. 102, west-bound, with light signals Nos. 113 and 104 respectively, in advance of the semaphores. As will be seen, the minimum of track sections is employed in this system, one to each block, and its transformer or source of energy is in the center and operates two track relays.

Referring to the above-mentioned block from Gambrills to Millersville, one of the relays, located at signal 115, is controlled by the track to a point *X* about 1000 ft. or more east of the center of the block, and the other relay, located at Signal 102, is controlled from this signal to a point *Y*, about 1000 ft. west of the center. Each semaphore signal is controlled by both track relays or the entire block. Each light signal is controlled by one track relay—i. e., the one at the opposite end of the block—and therefore by the two-thirds of the block at that end.

OPERATION OF SIGNALS

Considering the operation, an east-bound car entering the block under clear Signal 115 places this signal, as well as 102 and 104 at Millersville, to "stop." As it passes 113 at clear and reaches *X* it places the latter to "stop." When the car is in the center of the block, between *X* and *Y*, all four signals are held to "stop." The car is thus protected head and rear until Signal 102 is passed, when the block may again be entered at either end.

One advantage claimed for this scheme is the facility with which car meets can be made, as opposing cars can

W., B. & A. Signals—Relays, Relay Shelter and Semaphore Mechanism

proceed to a meeting point, such as Gambrills, without delaying each other or being subject to special rules as in systems having preliminaries. This is true because each block is a unit and a car in one block does not affect the movements of a car approaching an adjoining block. The light signals act as a check should two approaching cars pass opposing semaphore signals at the same time. For example, should an east-bound car pass Signal 115 at the same time that a west-bound car passes Signal 102, they would be stopped by Signals 113 and 104 respectively, and one must back out of the block so that the other may proceed. This condition arises only when one car has overrun its orders.

Another advantage claimed is the allowable close headway for following cars because the preliminaries are eliminated without complication of apparatus. Under a "pre-

W., B. & A. Signals—Switch Indicator, Switch Box and Insulated Switch Rods

liminary" system, following cars in one direction are spaced the block distance plus the preliminary, which in such a case becomes an overlap, and as there may be passenger stops in a preliminary the delay to a following car may be extended. This scheme is also flexible as regards special conditions, two of which are shown in this signaling. One is the use of switch indicators to control movements out of sidings where the regular block signals cannot govern.

SWITCH INDICATORS

Switch indicators are miniature unlighted semaphore signals mounted in iron cases set on 4-ft. iron posts and are generally employed to indicate when switches can be thrown to allow a movement from the siding to the main line. They do not apply to movements into the siding from the main line. It will be evident that under this system switch indicators are unnecessary at a siding, such as Gambrills, because a car desiring to enter the main line can be governed by the regular block signal No. 116.

The situation at Camp Parole, a double-ended 1000-ft. siding, required an arrangement whereby cars could safely and promptly enter the main line via the switch at the east end. As this siding is located on a curve and as a view of the block signal No. 17 would be impossible, at night in any event, a switch indicator was installed to provide the required indication. The situation at Crownsville is the same as at Camp Parole.

Each indicator is controlled by the block in which the switch is located and a preliminary extending beyond the west end of the block. This preliminary is installed, for example, at Camp Parole to prevent the switch being opened to let a car out of the siding while an east-bound car is approaching Signal 17, and, therefore, the latter car, on the main line, will have the right to enter the block. By the use of Signal 15 no preliminary is required for this indicator at the east end of the block, for should a west-bound car pass Signal 06 as the switch is thrown the car in the siding would be stopped by the west-bound car having placed Signal 15 to stop. Of course, a car leaving this east Camp Parole switch has clear signal No. 15 in advance

for its further information and assurance that the block is clear.

Cars on a siding may proceed promptly into the block when the block signal or switch indicator is clear. The action of each is wholly automatic and therefore requires no action on the part of the trainmen other than to stay or proceed according to the indication received.

SPECIAL SITUATION AT BEST GATE SIDING

The other special situation is the regular meeting point and passenger stop at Best Gate Siding. Here it will be noticed that Signals 18 and 27 are controlled by the track sections between Signals 18, 26 and 27, and Signals 47 and 28 by the sections between Signals 47, 28 and 27, whereas the track section on the siding controls Signal 26 only. If a west-bound car reaches the siding first and passes Signal 26 Signal 27 will clear for an east-bound car, and when the latter passes Signal 27 the west-bound car may proceed promptly under clear Signal 28. Should the east-bound car arrive first it will be held at Signal 27 until the west-bound car passes Signal 26. A passenger stop is located at Signal 27 and the east-bound car discharges passengers east of the signal, if the west-bound car is ready to proceed, but if the west-bound car has not arrived the passengers are discharged west of the signal. Signal 26 was provided to allow a west-bound car to pass Signal 18 and still protect a car standing on the Best Gate Siding.

The shuttle service between Annapolis and Camp Parole is protected by Signals 06 and 17, as the car does not proceed west of Signal 17 and is therefore protected by the two signals mentioned. This signal displaced a hand-operated light signal arrangement between Camp Parole and Annapolis.

POSITIONS OF SIGNALS AT SIDINGS

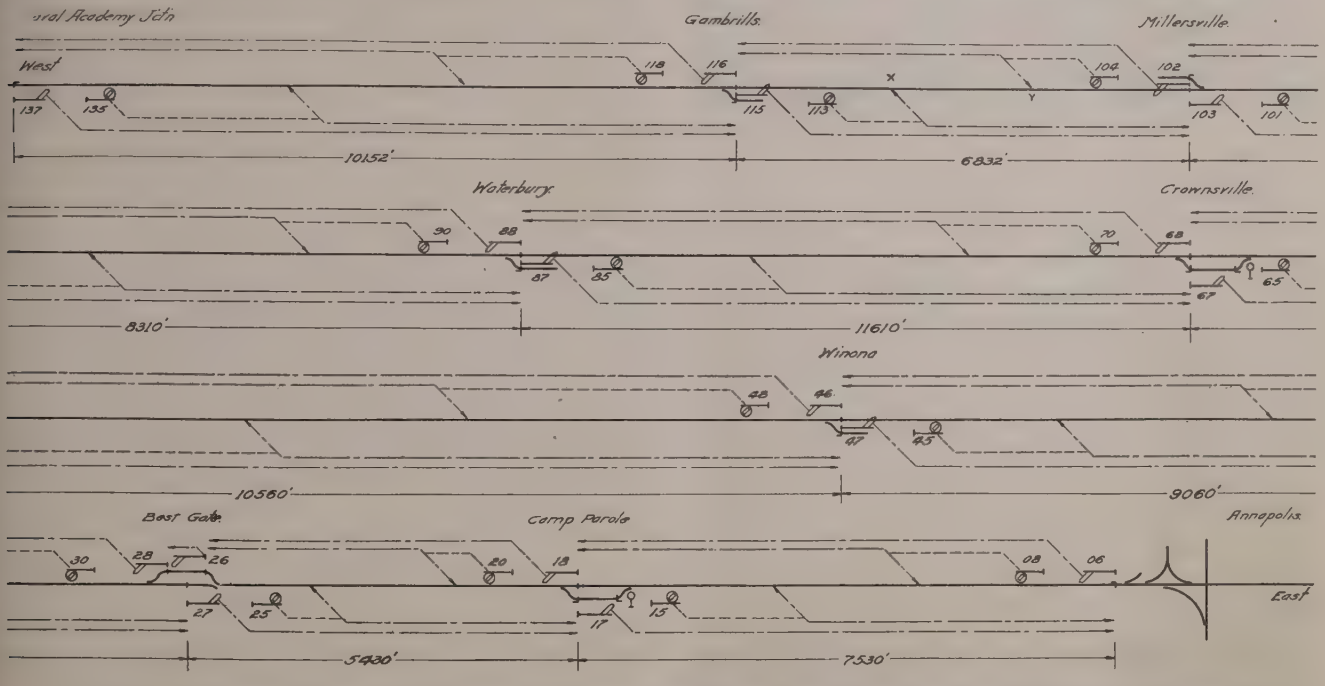
The signals at the sidings were located at the fouling point instead of at the switch point in order better to protect movements into the sidings and also cause minimum delay to cars approaching the switch. For example: Movements in or out of the switch at Gambrills do not affect the signals of the Gambrills-Millersville block and also do not prevent a west-bound car proceeding safely to Signal 116, which will be at stop if the switch is open or a car is fouling the main track. This switch will, of course, control Signals 137 and 135 as well as 116. If the signals were located at the switch point, an east-bound car taking the siding would necessarily hold Signal 102 at stop, and if a west-bound car had passed this signal there would be danger of having it hit the car entering the siding.

GENERAL CONDITIONS

Each switch, except the two at Best Gate Siding, which are trailed through, is equipped with circuit controllers so arranged as to hold to "stop" all signals governing the block in which the switch is located when the points are not correctly set for the main line.

On this road cars head in and back out of sidings except when this is prevented by special conditions. At present there are no distant signals, but marker boards stating "Block signal 1000 ft." are used instead.

No propulsion or other than the regular signaling current is employed for signaling purposes. The current for the signaling system is distributed by means of separate mains. This makes the signaling independent of interruptions and low-voltage conditions, which would be incidental to its supply by the propulsion system. Power for this installation is taken from a substation located at Naval Academy Junction where available 370-volt, 25-cycle current is transformed to 2200 volts for distribution over the signaled territory. A separate General Electric Company's one-panel switchboard with ammeter and switches is included in the equipment in the substation.



W., B. & A. Signals—Diagram of Circuits for Single-Track Line from Naval Academy Junction to Annapolis

The line wire equipment consists of two 2200-volt and three or four 110-volt line wires extending the length of the signaled territory. Transformers, high-tension plug cut-outs and high-tension lightning arresters are mounted on additional short arms located on the regular trolley poles. Transformers located in the center of each block and tapped to the 2200-volt line supply current through one secondary at about 10 volts for the track circuits and through another secondary at 110 volts for the signal circuits.

The light signals are constructed of cast iron and provided with hoods and shields to improve the daylight indications by offsetting the effect of the sun. These signals have two 5-in. lenses, one red and one green, and behind each are located two lamp bulbs wired in multiple. It is assumed that only one lamp will burn out at a time. No reflectors are employed.

Exhaustive tests showed conclusively that arc headlights have no effect on the distinctness of the indication of

this light signal. These light signals give a distinct proceed indication at about 1600 ft. and the stop indication at 1800 ft. under the most unfavorable daylight conditions. The lights employed in these signals are of the tungsten type, and the energy required for one entire signal is less than that required for one 16-cp carbon lamp.

Each light signal is controlled directly by a 110-volt line

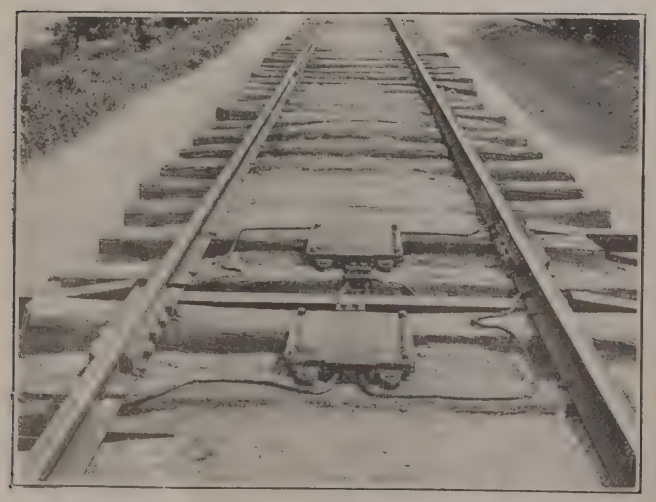
W., B. & A. Signals—Block Signal Marker Sign

relay, which, in turn, is controlled by the galvanometer type track relays.

The lamps behind the green lens are controlled by the front contact (closed with the relay energized) of the line relay, and the red lens lamps are controlled by the back contact (closed with relay de-energized) of the same relay.

The semaphore signals are controlled directly by contacts on the track relays and also by contacts on the light signal line relay; without the use of extra line relays. The semaphore signals are electrically lighted and are of the two position, horizontal to 60-deg., upper left-hand quadrant, style B, bottom-post mechanism type.

All track circuits are of the double-rail type which provides a two-rail return for the propulsion current. Adjoining track circuits are separated by impedance bonds having a capacity of 500 amp per rail, and all insulated rail joints



W., B. & A. Signals—Impedance Bonds

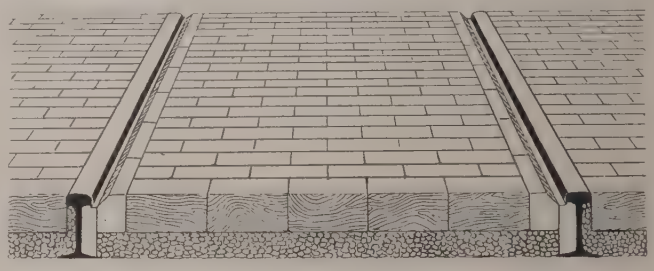
are of the Keystone type. The track circuits are carried into the sidings to the fouling or clearance points. All circuits are fused and provided with lightning arresters connected to a deep ground.

An existing ground wire protecting the propulsion feed and high-tension wires is grounded to the rails by connection to the neutral of the impedance bonds located at each siding. The relays and low-tension lightning arresters are located in wooden boxes mounted on the trolley poles or on separate iron posts.

The material for this installation was furnished and installed by the Union Switch & Signal Company under the direction of J. J. Doyle, general manager, and E. W. Weinland, engineer maintenance of way Washington, Baltimore & Annapolis Electric Railway.

TRACK CONSTRUCTION WITH FILLER AND STRETCHER BLOCK AT QUINCY, ILL.

Previous to the current year, the Quincy Horse Railway & Carrying Company, Quincy, Ill., used a 6-in. T-rail and brick paving. Late in the summer, however, the city of Quincy contracted to relay with creosote wood blocks the four sides of the square in the heart of the business district. This change made it necessary to select some form of blocks to form a flangeway for the rail. The original intention of the city authorities was to order the use of a grooved rail, but after the railway company had secured some samples of filler and stretcher block from the Nelsonville (Ohio) Brick Company and had submitted them to the city officials the latter were convinced that the traffic conditions would be satisfied by using this block in connection with the railway's standard 6-in., 73-lb. T-rail. Owing to some delay on the part of the contractor the new construction will not be put down for several weeks to come.



Filler and Stretcher Block Applied to Concrete-Base T-Rail Construction with Wood Paving

The character of construction—namely, creosote wood blocks with brick filler and stretcher along the flangeway—is shown in the accompanying cross-section. The concrete work on the side of the streets between the rails and the curb will be brought up to within 4 in. of the finished surface, which will allow 3½ in. for the wood blocks and ½ in. for the sand cushion. The length of tie is 8 ft., which corresponds to the width of pavement to be paid for by the company under its franchise. In relaying this track and resurfacing the railway will place the ties, relay, tamp and line the track. The rest of the work will be done by the city's contractor as the company has found that this practice works out better than doing all the work itself.

Among the several new electric railways projected in Germany recently are one from Frankfort-on-the-Main through Kronberg to Königstein; the Cologne to Bonn and the Cologne to Düsseldorf lines, for which and other works the Town Council of Cologne has just approved a loan of £3,950,000; a line from Lützelburg (Alsace-Lorraine) to Dagsburg and Wangenburg; a line from Neuss (Rhine Provinces) to Rheydt, with branches to Holzhain and Munich-Gladbach, the joint concern of the several towns named; a line from Offenbach (Hesse) to Isenburg, Sprendlingen and Egelsbach, and a line from Wilstedt to Zeven and Tostedt, estimated to cost £165,000; also two electric tramway schemes—one from Darmstadt to Offenbach, and another in the town of Insterburg, in East Prussia.

Three-Car Storage Battery Train

A Description of the First Storage Battery Train Ever Operated, and of General Progress in Storage Battery Traction

On Wednesday afternoon, Sept. 25, the Federal Storage Battery Car Company, Silver Lake, N. J., gave a demonstration run from the Pennsylvania terminal in New York to Long Beach, Long Island, a round trip distance of about 52 miles, with the first storage battery train ever operated. The equipment consisted of three cars which have been built for the United Railways of Havana for use on a 7-mile suburban line where the traffic conditions make two or three-car operation desirable during certain hours of the day. The start from the terminal was made about 3:15 p. m. Upon reaching Long Beach, the cars were inspected in detail. Following this, the guests were entertained at a lunch at which Ralph H. Beach explained the merits of modern storage battery traction. The train then returned to New York, making the run of 26 miles in exactly fifty-two minutes. This, of course, means that the speed at times exceeded the 30 m.p.h. for which the motors are geared. About 100 engineers, financiers and press representatives were the guests of the Federal Storage Battery Company and of F. J. Lisman & Company, the New York bankers, who are actively interested in the company.

Storage Battery Car Train for United Railways of Havana

The accompanying illustration shows this three-car train in the yard of the car company before it had the demonstration run just described. Each car is a passenger car and seats forty people. The general equipment is of the M. C. B. standard as to wheels, height of drawbar, draft rigging and air brakes. The train is equipped with a unique system of multiple-unit control and is driven by 210 cells of the Edison A-6 battery. In each car are also twenty cells of A-6 battery which perform the functions of lighting the train and energizing the master control circuit of the multiple-unit system. The air equipment is both storage air and regular straight air for operation with a locomotive. The speed of this train is 30 m.p.h. with full load, and the energy consumption per ton mile at this speed is 45 watt-hours. In test runs of cars on level track at a speed of 25 m.p.h. a current consumption of 27 watt-hours per ton mile has been observed. It is believed that this record has never been approached by any other method of driving. The rate of acceleration is 0.6 m.p.h.p.s.

Each car is equipped with four 200-volt, 37½-amp motors. These motors are connected with gear and pinion to the hub of the respective wheel to which they are attached, the whole constituting a method of driving which has been applied during the last two years by the company on all of its cars. The weight of the cars complete, ready for operation, is 37,000 lb. each. The platforms are so arranged that by closing the center and side doors and lowering the trap doors over the steps the platform is entirely inclosed. The side doors may be opened and the trap doors thrown up to permit entrance and exit of passengers, or the center door may be opened and locked open, leaving a free aisle through the train with the side doors closed, thus making an inclosed vestibule.

The underframing of the car throughout is steel in angles and shapes. Side sills are inserted in a 6-in. steel channel and bolted thereto. The car framing proper is of white ash, treated with a carbolic preparation. There is a double sheathing of cedar on the outside while the interior sheathing is of mahogany. The posts are sheathed also on the outside with cedar. The letterboard is of cedar. The car interior, window and doors are framed in mahogany. The roof consists of pressed-steel carlines in one piece, cedar roof-boards, composite headlining and an outer cover of 8 oz. duck. The lighting outfit consists of 20-cp headlights with parabolic reflectors and sixteen 12-cp lamps for the interior lighting.

This is the first instance where a train of cars has been driven with a storage battery. In test trials which were conducted last week on the Erie Railroad tracks the train was found to meet all requirements. One peculiarly interesting multiple-unit test was the following: Cars were uncoupled and moved apart about 1 ft., and the air hose was disconnected, leaving only the two-conductor cable for operating the controller. Then the cars were operated up to maximum speed and yet were found to maintain their relative positions within about 6 in., an excellent illustration of the perfection of the control system. In this control two conductors are used between cars with a ground return. If desired, even a single conductor would answer. The total equipment of the multiple-unit control including everything weighs 900 lb. About 400 lb. of this, however, is not essential and can be removed. This system does all of the things that multiple-unit control should do, such as making the various combinations required for series-parallel control of the motors, resetting circuit breakers, etc.

GENERAL PROGRESS OF BATTERY TRACTION.

In connection with the foregoing it may be of interest to summarize the important work which the Federal Storage Battery Car Company is doing in building cars with Edison batteries, and to relate the conditions under which the cars are being operated. It is now constructing 50-ft. cars for the Chicago Great Western and the Chicago, Terre Haute & Southeastern railroads; an articulated two-car train for the Twin Falls Railway of Idaho; a combination passenger, express and smoking car for the Kansas City & Memphis Railroad for service in the Ozark Mountains; cars of various descriptions for the Boston, Revere Beach & Lynn Railroad and the Burlingame Electric Company, the latter operating on a long 13 per cent grade at Oakland, Cal.; cars for the Bush Terminal Railroad, Brooklyn, N. Y.; the Central Park, North & East River Railroad and the Balti-

more & Washington Transit Company, Washington; the Municipal Railways of Kioto, Japan, and Gisborne, New Zealand; also for the Tiana Valley Railroad, Fairbanks, Alaska. The characteristic features of the Beach-Edison cars have, of course, been previously described in these columns, but the following paragraphs are of interest as showing exactly what they have done under a great variety of conditions.

The Billings Traction Company, Billings, Mont., bought two single-truck cars which were delivered in the winter of 1911. Since then three repeat orders for similar cars have come from this company. The cars run from 75 miles to 140 miles a day and are of the one-man prepayment type. The company reports that the operating and maintenance costs, including energy, platform wages, labor of charging, station men, repairs and material for upkeep of cells, including flushing and renewal of electrolyte, amount to 7 cents per car mile. The energy consumption averages 385 watt-hours per car mile and 52 watt-hours per ton mile, best battery output. The average efficiency of the battery in watt-hours is 68 per cent. The company first bought current at 2 cents per kw-hr., but subsequently it secured a lower rate by agreeing not to take current for several hours during the afternoon peak load. All cars are charged from one to five hours during the night off-peak load of the power plant and also at favorable load intervals during the day. The population of Billings is 7900.

The Suffolk Traction Company, Patchogue, N. Y., was organized some seven or eight years ago to lay 3½ miles of track for operation by overhead trolley. Patchogue is a summer resort, the winter population being about 8000 and the summer population about 40,000. The track was laid, but it was impossible to secure enough capital to complete the installation. On June 26, 1911, this company installed its first Beach-Edison car and on July 12, 1911, its second car. The first season was finished on the original track and, although a high rate for energy was paid to the local lighting company, the railway finished its first summer season with a net profit of $4,800 in excess of its operating and maintenance expenses. This practical demonstration of the storage battery system enabled the company to secure enough capital to complete its line entirely across Long Island. During the summer of 1912 this company operated three single-truck cars which earned about $30 a day each and ran 100 miles to 130 miles a day on a road with a maximum grade of 4½ per cent. The average energy consumption was 380 watt-hours per car mile and 50 watt-hours per ton mile, based on the battery output. The entire operating and maintenance expense was at 11 cents per car mile, although the company had to pay 3¾ cents per kw-hr. for energy besides a high standby charge. At present this railway does not take current during the evening peak load of the lighting company. It plans to install its own plant, probably an oil electric set, as soon as the line across Long Island is finished. The railway believes that the previous cost of 11 cents will be cut down to 9 cents per car mile in view of the greater skill of the men and the improvements in track and general administration.

The Carolina Traction Company, Rock Hill, S. C., operates 3 miles of track in a town of 7900 people. It purchased two cars in February, 1912, and a third car in April, 1912. These cars run from 75 miles to 100 miles a day, averaging 271 passengers per car a day. The energy consumption averages 536 watt-hours per car mile and 74 watt-hours per ton mile, based on readings of the battery output at the motor brushes. The maximum grade is 3½ per cent. The company pays the Hydro-Electric Power Company 1 cent per kw-hr., and its operating and maintenance expense is estimated at 10 cents per car mile. A peculiar feature is that a large percentage of the gross earnings comes from chartered-car parties which are run during off-hours without conflicting with the regular service.

The Washington, Spa Springs & Gretta Railroad, Washington, D. C., operates a 4-mile line in the suburbs of Washington. It installed a Continental or twin-type car on March 30, 1912. Energy is available at each end of the line. A charging plug, therefore, has been installed at each terminal where the car is charged for three minutes at five times the normal rate, thus enabling it to run for fifteen minutes, the time required for one 4-mile trip. The three minutes consumed for this boost is estimated to be no more than that required by the local trolley cars in changing their double trolley poles and fenders, securing dispatchers' orders, etc., so that the battery car makes the same schedule as the trolley cars, namely 145 miles a day, although it contains only 210 A-4 cells, which would operate it only 60 miles on one normal charge in this service. This road, with the exception of 800 ft., is on grades, some as steep as 8 per cent. The average energy consumed is 850 watt-hours per car mile, or 81 watt-hours per ton mile. The battery car company will soon deliver two additional cars of the same type for operation over a 4-mile extension, upon the completion of which the railway will take down its overhead trolley and use battery cars exclusively.

The Wilmington, New Castle & Delaware City Traction Company, Delaware City, Del., is 11 miles long, and put one 31-ft. Continental type of car in service on Nov. 1, 1911. This car is equipped with 210 type A-4 cells and has operated from 144 miles to 170 miles a day over a road with many grades. It is now operating into and through the business section of Wilmington. The company has recently purchased a large interurban combination storage-battery car.

The Pennsylvania Railroad formerly operated a branch line between Montandon and Mifflinburg, a distance of 11 miles, on which a two-car steam train was run. The gross earnings for two round trips a day averaged $450 a month. The only intermediate town of importance is Lewisburg, with a population of 4000. The Lewisburg, Milton & Watsonville Passenger Railway, which controls a trolley system connecting with this branch of the Pennsylvania Railroad, leased the right for passenger operation over the branch and on June 28, 1911, commenced regular operation with a double-truck storage battery car, the first of its kind. This car carries 200 A-6 cells and has been in operation continuously ever since. A report upon it contains the following data: Average run per day, 130 miles; average energy consumption, 612 watt-hours per car mile, or 36.3 watt-hours per ton mile, on a battery output basis; cost of operation per car mile, 10.63 cents. This car stops at any point on signal and makes eleven round trips a day instead of two round trips as was done with the steam train. The frequent service has been the chief cause for the increase of earnings from $450 to $1,000 per month. The car seats forty passengers and has a double platform 6 ft. 6 in. long at each end to carry mail, baggage and express.

The Cambria & Indiana Railroad Company installed several months ago a large combination car mounted on the Continental type of trucks for passenger service on its 11-mile line between Rexis and Colver, Pa. This car carries 130 A-10 cells. It was geared originally at 35 m.p.h., but has developed a speed of 39 m.p.h. on level track. When operated with the original gear ratio, the car made 66 miles a day with an average energy consumption of 487 watt-hours per car mile, or 29.5 watt-hours per ton mile, based on readings at the motor brushes. The gear ratio was reduced to 25 m.p.h. when the railroad extended its line 2½ miles to and through the town of Colver, the extension embracing a constant 5 per cent grade 2 miles long and calling for five stops.

The Ephrata & Lebanon Street Railway Company, Ephrata, Pa., installed two single-truck cars on July 23, 1912, on its 7-mile interurban line, which consists entirely of grades up to 6½ deg. The cars are equipped with 205 A-4 cells, run about 110 miles a day and average an energy

consumption of 415 watt-hours per car mile, or 46.5 watt-hours per ton mile, with an average passenger load of 3600 lb. (twenty-four passengers), the car weighing 7 tons. These cars make an average schedule speed of 6½ m.p.h.

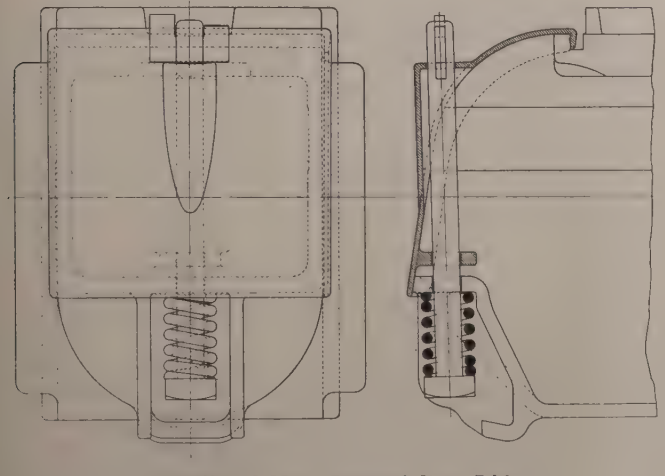
The Long Island Railroad installed a single-truck car on April 1, 1911, for service on a 2-mile branch between Bushwick Station and Bushwick Junction, a line which had been operated with a locomotive and combination car. The car makes 72 miles a day, or four trips more than a steam locomotive. The car has never failed and saves about $21 a day as compared with steam operation. The average energy consumption is 377 watt-hours per car mile, or 57 watt-hours per ton mile, based on battery output.

The Chesapeake & Ohio Railroad operates a double-truck car, of forty-two passenger capacity, between Covington Junction and Silver Grove, Ky. The car is equipped with 240 A-6 cells and when fully loaded operates at a maximum speed of 42 m.p.h. on level track. It runs 264 miles a day, although the guaranteed mileage capacity on a single normal charge is only 85 miles. The battery, therefore, is boosted at a high rate from fifteen minutes to 30 minutes for each round trip of 24 miles. Recent readings showed an average energy consumption of 743 watt-hours per car mile, or 41.2 watt-hours per ton mile. The car complete weighs eighteen tons.

JOURNAL BOX LID WITHOUT PROJECTIONS

The Third Avenue Railway, New York, has applied during the past year a new form of journal-box lid, which is the invention of J. S. McWhirter, its superintendent of equipment. The novel feature of the lid is its attachment to the box by means of a vertical bolt and key as hereinafter detailed. This construction permits the elimination of all projections beyond the face of the lid, an arrangement which is highly desirable in city service, where so many lids are liable to be torn off by obstructions, interfering wagons, etc. A journal box which is fitted with a lid of this kind should therefore be free from hot journals, scoring and other troubles due to the entrance of dirt.

The details of the lid are presented in the accompanying lettered drawing. It will be observed that a bolt and key are used to hold the lid up to its joint on the journal



Details of New Journal Box Lid

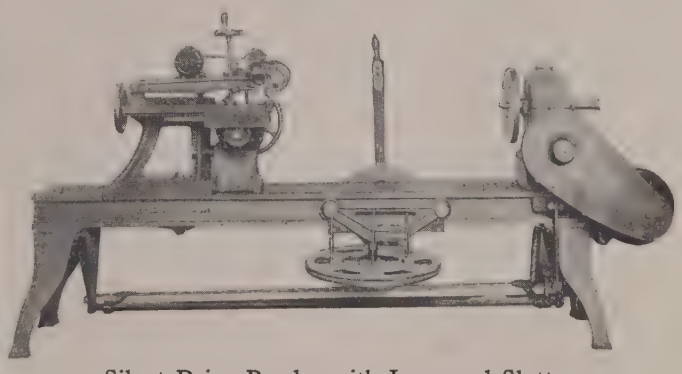
box. The bolt exerts a downward pull on the lid by means of a coil spring which is retained between the bottom surface of the box and the head of the bolt. The bolt passes through a hole in the journal box and through a hole in the lid, the end of the hole being slotted to receive the key. The coil spring has been left exposed to permit its ready inspection.

To apply the lid it is placed on the journal box in the position shown. Then the bolt is slipped through the holes in the box and the lid, upon which the key is inserted to lock the lid. Ready removal of the lid is obtained by fulcruming a bar at the point indicated in the drawing, thereby compressing the spring sufficiently to permit the removal of the key and the downward withdrawal of the bolt.

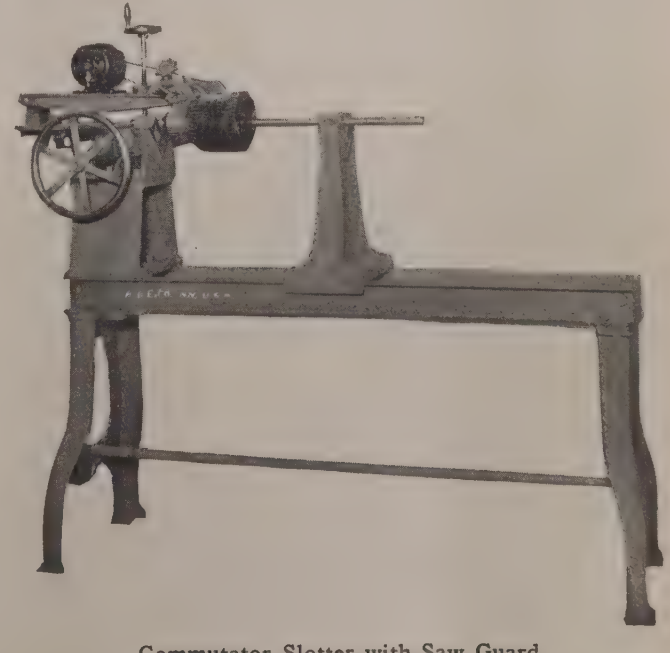
The T. H. Symington Company, Rochester, N. Y., is acting as sole manufacturer and selling agent for the McWhirter journal-box lid.

THE NEW INGENIOUS COMMUTATOR SLOTTING DEVICE

The American General Engineering Company of New York has recently put on the market the improved A. G. E. slotting device as shown separately in one of the accompanying illustrations and also as shown mounted on one of this company's silent chain-drive armature machines. This device, when made stationary and on its own bedplate, is 5 ft. 3 in. over all, 21¾ in. wide and has a swing



Silent Drive Bander with Improved Slotter



Commutator Slotter with Saw Guard

of 30 in. The machine is set on a steel bedplate resting on two pairs of cast-iron legs and the slotter is mounted on one end of the bedplate. The motor and slotting spindle are fitted to the base, which has a vertical adjusting screw whereby the slotter can be raised or lowered to take the various standard sizes of commutators. A transverse travel of 12 in. can be obtained by means of the large wheel shown, while the star-shaped wheel forms the head

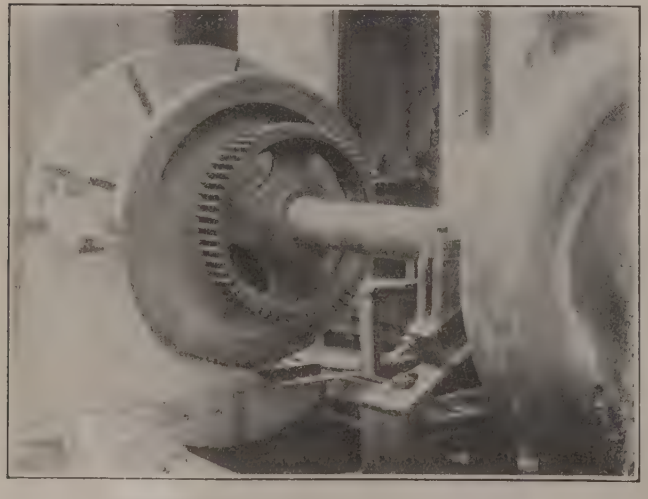
of the screw for locking the carriage. The armature rests in two V-blocks, one being stationary and the other movable. Extra blocking is used to raise small commutators within range of the saw, but no blocking is necessary for the standard railway commutators because the adjustment is designed to meet this condition. The machine, therefore, has a complete range for slotting the smallest to the largest type commutator. A very interesting feature is the adjustable slotting spindle which can be pushed aside so that the operator can insert the commutator without danger. By bolting this slotter to the front of the tailstock it can be used in combination with the company's bander, which was described on page 592 of the Electric Railway Journal for April 6, 1912.

IMPROVED ATTACHMENTS FOR DOUBLE-SPINDLE LATHES

There have been recently added to the McCabe double-spindle lathe two improvements of unusual design. This type of lathe, as is well known, is a tool covering a wide range, being used ordinarily as a standard 26-in. lathe, but being capable of swinging work, having a diameter of 48 in. when the upper spindle is used. The lathe is thus employed extensively for turning steel-tired car wheels in shops where not enough of this class of work exists to keep a standard wheel lathe busy all of the time.

As shown in the accompanying illustration, for work of large diameter, such as when a pair of wheels is being turned, a tool-post composed of a single block of steel has been added to the lathe equipment. This tool-post is extended at the base to provide a long bearing on the carriage and give the rigidity necessary to withstand the tilting effect of the heavy tool pressures such as are applied at the cutting tool when high-speed steel is used for turning hard spots out of a pair of old steel wheels. The weight of the cast-steel tool-post also assists in preventing chattering of the tool, and its box construction eliminates any possibility of insufficient strength.

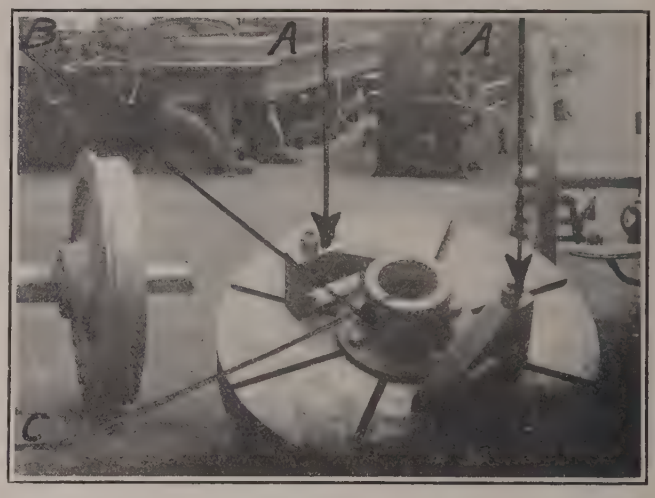
Another new attachment consists in a socket plate, which can be bolted to the 48-in. face plate and takes the place of the self-centering face plates on standard wheel lathes.



Double-Spindle Lathe—Improved Tool Post

This socket plate fits into a recess in the face plate, thus being centered automatically, and is bored out to receive the journal of a pair of wheels together with tapered split bushings for centering the journal in the bored hole. The wheels are driven by driver arms or extended lugs bolted to the face plate, having a wide base to maintain rigidity and a short heavy stud to engage with holes in the webs of the wheel.

The accompanying illustration shows a face plate with the socket, marked *B*, bolted in place. The driver arms, marked *A*, are shown bolted to the face plate on either side of the socket plate, the studs which engage with the holes in the web of the wheel being shown next to each arrow head. The journal of the pair of wheels to be turned is inserted in the large tapered hole in the socket plate marked *C*, and is centered by pressure from the tailstock against



Double-Spindle Lathe—Face Plate with Wheel-Turning Attachments

three-piece tapered split bushings surrounding the journal and fitting the bore of the hole.

The arrangement obviously prevents any possibility of a heavy cut making the work jump off the centers, and on account of the broad bases of the socket plate and driver arms it increases the stiffness of the drive as a whole. As no part of the drive or tool post extends inside of the wheel, it is possible to turn wheels when mounted on the axle either with or without the gear.

COLORADO ELECTRIC LIGHT, POWER & RAILWAY ASSOCIATION

The Colorado Electric Light, Power & Railway Association held its tenth annual convention in the assembly room of the Hotel Colorado, Glenwood Springs, on Sept. 12, and continued the meetings through Saturday. The convention was called to order on the afternoon of Sept. 12 by President W. E. Robertson, of the Leadville Light & Power Company. The first paper on the technical program was one by E. M. Fay, of the Westinghouse Electric & Manufacturing Company, entitled "Some Phases of Central-Station Load Building." A paper on "The Electric Vehicle as a Source of Revenue to the Central Station" was read by George D. Luther, of the Electric Storage Battery Company. In the evening moving pictures used in advertising the electric service were exhibited. The first of these, which belongs to the Northern Colorado Power Company, showed a number of uses of the electric motor in the rural districts in the northern sections of the State. R. E. Campbell, of the National Electric Lamp Division of the General Electric Company, followed with a paper on "The Proper Lamp for the Circuit." A demonstration of the Drager pulmotor, the property of the Denver Gas & Electric Light Company, was given by Harry Wickstrom, of that company. On the afternoon of Sept. 13 the first paper presented was one on "Industrial Loads," by W. S. Harrison, of the Westinghouse Electric & Manufacturing Company.

The last paper of the convention was one on "Boiler Efficiencies," prepared by A. B. Carpenter, of the Pueblo & Suburban Traction & Lighting Company.

ELECTRIC RAILWAY LEGAL DECISIONS

CHARTERS, ORDINANCES AND FRANCHISES

New York.—Liability for Overcharges.

A street surface railway running a line through the country between two different towns, and incorporated under railroad law (Consolidated Laws 1910, Chap. 49), Art. 5, is subject to Sec. 59 of that act, which imposes a penalty upon any railroad corporation asking or receiving more than the lawful fare. (King v. Syracuse, L. S. & N. R. Co., 131 N. Y. Sup., 878.)

New York.—Reorganization—Issue of Stock and Bonds—Power of Public Service Commission.

A new corporation, organized under stock corporation law (Consolidated Laws 1909, Chap. 59), Secs, 9, 10, to take over the property of a corporation on the foreclosure of a mortgage on its property is subject to Public Service Commission law (Consolidated Laws 1910, Chap. 48), Sec. 55, conferring on the Public Service Commission supervisory power over the issuance of stocks and bonds, but the commission may not refuse permission to the new corporation to issue stocks and bonds, not exceeding the amount of outstanding securities of the old corporation and the additional money to be paid to the new corporation. (People ex rel. Third Ave. Ry. Co. et al. v. Public Service Commission for First Dist. et al., 96 N. E. Rep., 1011.)

New York.—Fares and Transfers with Consolidated Company—Statutes—Applicability.

A street surface railroad corporation which acquires by consolidation a railroad within the city of Brooklyn and a railroad partly within the city and partly in Jamaica is not, after the creation of Greater New York City, which included Brooklyn and Jamaica, liable to the penalty imposed by railroad law (Consol. Laws 1910, Chap. 49), Sec. 104, requiring corporations to carry for one fare and give transfers for a continuous trip, since Greater New York Charter, Sec. 1538 (Laws 1901, Chap. 466), provides that the franchises previously granted by any of the consolidated municipalities shall be restricted to their respective limits before consolidation, and since Sec. 104 expressly applies only to railroads wholly within the limits of any one city. (Braffett v. Brooklyn, Q. C. & S. R. Co., 97 N. E. Rep., 888.)

New York.—Corporation Taxes from Companies in the Hands of Receivers.

The tariff act of Aug. 5, 1909, Chap. 6, Secs. 38, 36, Stat. 112 (U. S. Comp. St. Supp. 1909, p. 844), imposes a corporation tax on corporations, joint-stock companies or associations organized for profit, doing business under the laws of the United States or of any state, equivalent to 1 per cent of the entire net income over $5,000 received from all sources during the year, exclusive of amounts received by it as dividends on stock of other corporations subject to the tax, etc. Held, that such act did not include the property of street railroad companies in the hands of receivers appointed by federal courts. (Pennsylvania Steel Co. et al. v. New York City. Co., et al. (four cases), Central Trust Co. v. Third Avenue R. Co., et al. (four cases), 193 Fed. Rep., 286.)

New York.—Passenger Rates—Statutory Provisions.

Railroad law (Laws of 1890, Chap. 565), Sec. 101, provides that a street railroad corporation shall not charge any passenger more than 5 cents for a continuous ride from any point on its road or a branch under its control to any other point thereon within the limits of any incorporated city, and Sec. 39 imposes a penalty for a charge of more than the lawful rate. The Milburn agreement, entered into between the city of Buffalo and several named street railroads, effective by Laws 1892, Chap. 151, prescribes that a passenger is entitled to a continuous trip over the most direct route within the city of Buffalo for a single fare of five cents. Held, that the lawful rate of fare for a continuous trip over the most direct route within the city of Buffalo is that prescribed by the Milburn agreement, and that in so far as the agreement fixes such fare, it is a substitute for the rate fixed by Sec. 101, and that for a violation of the rate, as fixed by the agreement, a company is subject to the penalty prescribed by Section 39. (Bingemann v. International Ry. Co., 131 N. Y. Sup., 4.)

New York.—Insolvency and Receivers—Claims Provable Against Receivers.

A lease of a street railroad system, made up in part of lines held by the lessor under leases, contained a provision that "the lessee shall also from time to time pay or cause to be paid all rentals and other sums of money which are or may be or become due or payable under or by reason of any leases and other contracts to which any of the demised property is or may be subject, and the lessee hereby assumes all the obligations of the lessor under all such leases and contracts, and the lessee agrees to pay all interest upon the funded debt of the lessor and other fixed charges of the lessor, provided that the lessee shall not be required to pay the principal of any funded obligations of the lessor or of its subsidiary companies except as hereinafter provided." Subsidiary companies were defined in the lease as including companies whose lines had been leased to the lessor, and the lessor had guaranteed payment of both principal and interest of bonds issued by one of such companies at the time and in the manner provided in the mortgage securing the same. Both lessor and lessee became insolvent and receivers were appointed, who surrendered the lease of such subsidiary company's line and restored the property to the owner. The mortgage was not due, but was declared due for default in payment of interest under a provision therein, although it had not been foreclosed. It contained a provision making the mortgagor liable in person only for the deficiency after the mortgaged property was exhausted. Held, (1) that the sums agreed to be paid by the lessee under such provisions of the lease were in the nature of rent, and on termination of the lease the liability ceased as to sums subsequently becoming due; (2) that the liability of the lessor on its guaranty was contingent on there being a deficiency, and that neither principal nor interest of the mortgage debt was provable against the estate of either insolvent company. (Pennsylvania Steel Co. v. New York City Ry. Co. et al., 189 Fed. Rep., 661.)

New York.—Car License Fees—Liability of Lessee—Construction of Lease—Franchise Tax—Paving.

A lease of street railroads, including lines held under leases by the lessor, containing provisions that the lessee should pay all taxes and assessments which might be imposed on the property during the term and by which the lessee assumed all obligations of the lessor under all leases and contracts, but directing the apportionment of the rentals "and other payments" between the periods preceding and succeeding the taking of possession under the lease, construed, and such provisions held to operate, prospectively only and not to render the lessee liable for car license fees which accrued prior to its taking possession, even though the lessor was obligated by its own leases to pay the same.

The payment of franchise tax for a stated year by a street railroad company cannot be presumed to include car license fees for such year, under tax law of New York (Consolidated Laws 1909, Chap. 60), Sec. 48, which permits a deduction of such fees when actually paid.

General railroad law of New York (Laws 1892, Chap. 676), Sec. 98, requiring every street surface railroad company, so long as it shall continue to use any of its tracks in any street, to pave and keep in repair the pavement between and alongside of its tracks, applies to a company operating tracks as lessee.

Where a street railroad company has laid pavement between its tracks as required by statute, the material used ceases to belong to the company and becomes part of the street, and the city cannot be required to pay for it on its removal to be replaced by a different pavement.

General railroad law of New York (Laws 1892, Chap. 676), Sec. 98, requiring a street railroad company "so long as it shall continue to 'use' any of its tracks in any street" to pave between such tracks, etc., applies to tracks maintained by a company under claim of right, although not actually used Co. et al. v. New York City Ry. Co. et al., 191 Fed. Rep., 216.)

Ohio.—Lighting Road and Bridges.

A municipal corporation has no authority to compel an interurban or street railroad company to light its bridge or railroad within the limits of such corporation. Sec. 1536, 176, Revised Statutes 1908, applies only to steam railroads. (Ohio Electric Ry. Co. v. Village of Ottawa, 97 N. E. Rep., 834.)

LIABILITY FOR NEGLIGENCE

Indiana.—Master and Servant—Master's Liability—Knowledge of Debt.

Employers' liability act, 1893, Sec. 1, Cl. 1 (Burns' Ann. St. 1908, Sec. 8017), makes every railroad or other corporation, except municipal, liable for personal injuries to an employee suffered through any defect in the condition of the ways, works and machinery used, when such defect was the result of negligence by it or some person intrusted with the duty of keeping such way, etc., in proper condition. Held, that the statute merely re-enacted the common-law rule existing prior to its enactment

If the track foreman of a street railway company was its agent to repair its track, notice to him as to the defective condition of the track was notice to the company so as to make it liable for injuries resulting therefrom to other employees.

An instruction in a motorman's action for personal injuries by a derailment claimed to have been caused by a defective track that if defendant had no knowledge of the defect in the track, and it could not have been discovered by ordinary care in time to have repaired it before the injury, defendant was not negligent, was more favorable to it than authorized, since it ignored defendant's duty to warn plaintiff of the defect if it had time to do so before the injury, even though there was no time to repair. (Indiana Union Traction Co. v. Long, 96 N. E. Rep., 604.)

Indiana.—Master and Servant — Vice-Principal — Fellow Servant.

Defendant's railroad rules provided that extra trains were not shown on the timetables and had no rights except those given by the train dispatcher, that they should not be run without orders from the dispatcher and that all interurban trains must report to the dispatcher at certain sidings. Defendant's general trainmaster, while the general superintendent of transportation was absent and while therefore in full charge of transportation, took out an extra car, and while operating the same himself as motorman caused the car to come into collision with a car operated by plaintiff in the opposite direction, resulting in plaintiff's injuries. The trainmaster took out the car without notifying the dispatcher and proceeded past one of the notification stations before reaching the point of collision without telephoning the dispatcher as required by rule. In fact, he was unable to do so because the telephone line was not in working order, due to the inclemency of the weather. Held, that the trainmaster, though operating the car himself, did not for that reason cease to be a vice-principal and become plaintiff's fellow servant, since his act in taking out the car and operating it over the road without notice to the dispatcher was the act of a vice-principal. (Indiana Union Traction Co. v. Pring, 96 N. E. Rep., 180.)

Kansas.—Injury to Pedestrians—Contributory Negligence—Non-Liability for Avoidable Accidents.

It cannot be held as matter of law that it is negligent to pass over a public crossing in a street where cars usually stop in front of an approaching street car, unless its proximity, its speed as it appears to the pedestrian, the signals, if any, and other circumstances are such that no other reasonable conclusion can be drawn.

Where a pedestrian killed by a street car was negligent, the street railway company is not liable, though the motorman might have avoided the accident if by ordinary care he had seen that the pedestrian was in danger of being struck by the car, but is liable only in case the motorman might have avoided the accident after he actually did see the pedestrian. (Marple v. Topeka Ry. Co., 118 Pac. Rep., 690.)

Kansas.—Injury to Passengers Transferring.

The defendant operates a double-track railway running east and west. West-bound cars run on the north track and east-bound cars run on the south track. Passengers are transferred to west-bound cars from another line operated by the defendant coming from the south. To make the transfer, it is necessary to cross a portion of the street and to cross the south track of the double line. At a certain time of day persons make this transfer with a rush, and in sufficient numbers to crowd the cars. To receive them, the rear vestibules of west-bound cars are opened on the north side and the front vestibules are opened on the south side. At the time of day referred to the plaintiff, who had paid his fare and had received a transfer entitling him to ride on a west-bound car, made this transfer with a number of others. He crossed the street, crossed the south track, crossed the space intervening between the tracks, and mounted the step of the west-bound car while it was standing still. Other persons entered ahead of him on the same side of the car, the vestibule was crowded, and he had no room to get higher. He waited a brief period for the people to get settled, and then tried to put his foot up another step, when he was struck by an east-bound car on the south track. Held, that the plaintiff was a passenger and entitled to the protection due a passenger. (Koran v. Metropolitan St. Ry Co., 118 Pac. Rep., 875.)

Massachusetts.—Burden of Proof of Cause of Jolt.

If a street car company introduces evidence to show that it was not negligent in causing the car to be severely jolted, injuring a passenger, the passenger still has the burden of proving negligence, though the jolt, if unexplained, would be presumptive evidence of negligence. (Webber v. Old Colony St. Ry. Co., 97 N. E. Rep., 74.)

Massachusetts.—Injury to Policeman While Standing on Step.

A police officer boarded a street car while in the performance of his duty of regulating the movements of cars and vehicles at a street corner and while standing on the step was injured. He claimed that the operator of the car was negligent, but the court held that all that the street railway was required to do was to abstain from wantonly exposing him to danger. (Ahern v. Boston Elevated Ry. Co., 97 N. E. Rep., 72.)

Massachusetts.—Injury to Child Six and a Half Years Old—Question for Jury.

Where a child six and a half years old was struck by a street car whether she was guilty of contributory negligence is a question of fact, to be determined by the standard of care required of a child of that age under the circumstances.

In an action for injuries to a child struck by a street car evidence that she was behind a standing car and listened and did not hear any car coming, that she knew of the custom to sound the gong on a car approaching a standing one, and that she relied somewhat on the fact that she heard no warning gong from the car which struck her, was evidence of some care on her part. (Purcell v. Boston Elevated Ry. Co., 97 N. E. Rep., 626.)

Massachusetts.—Traveler at Crossing Accident—Contirbutory Negligence.

Plaintiff's intestate, being about to drive across a street on which defendant's street car tracks were located in the center of the street, looked up and down the street for cars as soon as he could see along the street. He saw one approaching on the track nearest him, but more than 150 ft. from where he was crossing. He continued his way, the horse trotting or jogging, and before he could get across the car struck the rear end of the buggy. The car was moving at an unreasonable speed and in violation of an ordinance providing that cars approaching any public or private way intersecting a railway track must reduce speed to such a rate as will make it possible to stop immediately. Held, that intestate was not negligent as a matter of law. (Farris v. Boston Elevated Ry. Co., 96 N. E. Rep., 1098.)

Michigan.—Proper Length of Stop.

A street car conductor when signaled to stop to discharge passengers must ascertain how many intend to alight and wait long enough to allow them to alight safely, by exercising reasonable diligence, and must ascertain that no passenger is in a position of danger when the car is again started.

When a street car has stopped for such a time that one able to alight or enter with reasonable speed could have done so the conductor may rely on the assumption that the purpose of stopping the cars is accomplished, in the absence of contrary knowledge. (Keeley v. City Electric Ry. Co., 133 N. W. Rep., 1085.)

Minnesota.—Temporary Road Liability.

To facilitate public travel upon a highway over and across

which a company was constructing its railroad grade and completely obstructing the highway, it voluntarily acquired from an adjoining landowner the right of passage over his land and impliedly, if not expressly, invited the public to make use of the substituted way. It was held that the railway company was under legal obligation to keep and maintain the way so provided in reasonably safe condition for public use. (McCoy v. Minneapolis, St. P., R. & D. Electric Traction Co., 134 N. W. Rep., 293.)

Missouri.—Liability for Injuries—Humanitarian Theory.

Where the motorman of a street car saw a hack upon the track in time to have avoided striking it, though he had a right to expect that the driver would heed the ringing of the bell and would get off the track, yet if he saw, or might have seen, that the driver did not heed the warning, it became his duty to check his car in time to prevent it from reaching the vehicle. (Keyes v. Metropolitan St. Ry. Co., 144 S. W. Rep., 166.)

Missouri.—Carrier and Passenger—Creation of Relation.

While one may not create the relation of passenger and carrier between himself and a street railway company by merely attempting to board a moving car, the relation may be found to have been created by plaintiff having signaled an approaching car and by the car having immediately slowed down until it practically stopped at its usual stopping place, where he attempted to board it. (Palfrey v. United Rys. Co. of St. Louis, 142 S. W. Rep., 774.)

Missouri.—Duty to Children on or Near Tracks—Schools.

The presence of a child but three years of age on a street railroad track is in itself sufficient warning to the motorman to put his car under immediate control.

In an action for injuries to a child from being hit by a street car, testimony that the street at the point at which the injury occurred was used by large numbers of children attending school near by was admissible to show the necessity for watchfulness. (Wagner v. Metropolitan St. Ry. Co., 142 S. W Rep., 463.)

Missouri.—Duty of Motorman in Congested Streets.

A motorman who operates a car following a vehicle on the track in a street obstructed so as to render it almost impossible for the vehicle to turn out, and who knows that because of the conditions of the traffic the vehicle is liable to come to a sudden stop, must keep his car under complete control so that it can be stopped instantly, and the failure so to control the car is actionable negligence. (McCloskey v. United Rys. Co. of St. Louis, 142 S. W. Rep., 737.)

Nebraska.—Fellow Servants—Who Are.

One who for the purpose of qualifying himself to serve a street railway company as a conductor is permitted to go upon its cars and perform such service as the conductor directs is the company's servant notwithstanding that he receives no wages from his master. The motorman upon the car is his fellow servant. (Justus v. Lincoln Traction Co., Inc., 131 N. W. Rep., 941.)

New Jersey.—Unguarded Third Rail—"Byway."

A railroad company is under a duty not to subject the traveling public to latent dangers at crossings which the public is entitled to use. (Tarlucki v. West Jersey & S. R. Co., 81 At. Rep., 495.)

New Jersey.—Injuries to Passengers from Ice on Car Step.

A carrier of passengers for hire is legally responsible for injuries happening to a passenger for such an accumulation of ice upon its car steps as to cause a passenger, using ordinary care, to slip and fall, if sufficient previous opportunity has been had to remove the source of danger. The duty of the carrier in such regard is not performed simply by appointing servants whose duty it is to keep the car steps in a safe condition, nor is it any excuse that the servants neglected their duty, and where a substantial conflict as to the actual performance of such duties by the servants appears from the evidence such conflict must be determined by the jury. (Murphy v. North Jersey St. Ry. Co., 80 At. Rep., 331.)

New York.—Injury to Passenger on Running Board.

A passenger on a crowded open trolley car stood on the running board instead of occupying an uncomfortable position between the seats. The conductor, on approaching a trestle, warned him of the danger thereof, and he stepped inside. After the car passed the trestle, he stepped onto the running board again, with the knowledge of the conductor, and he was injured by being struck by a girder of a bridge, of which the conductor gave no warning. Held, that the conductor was negligent in failing to repeat the warning to the passenger. (Edwards v. New Jersey & H. R. Ry. & Ferry Co., 129 N. Y. Sup., 717.)

New York.—Lawful Speed in Fast Suburban Train Service.

A railroad company, operating a fast suburban train service between cities over its own roadway and running cars at frequent intervals, need not run its cars when approaching a highway crossing so as to be able to stop within a comparatively few feet. But where it operates its cars over a crossing about 1500 ft. from a small village, and where there are only three houses along the highway within about 1000 ft. from the track, it may run at a high speed, on giving the required signals for the crossings, without becoming liable for the death of a child struck at the crossing. (Orafina v. New York State Rys., 132 N. Y. Sup., 784.)

Texas.—Admissibility of Rules of Company on Speed.

In an action by a passenger for personal injuries from derailment of a car at a switch at which it was shown a previous accident had occurred, evidence as to the company's rules as to rate of speed in going over switches was admissible to show that the company knew such an accident was liable to occur at this place and in recognition of the danger had promulgated the rule. (Texas Traction Co. v. Hanson, 143 S. W. Rep., 214.)

Washington.—Injuries to Person on Tracks at Crossing—Question for Jury.

As a street railway has no absolute right-of-way at a street crossing, whether a motorman could have seen a person on the track in time to have stopped his car and avoided the injury was a question for the jury. (Morris v. Seattle R. & S. Ry. Co., 120 Pac. Rep., 534.)

Wisconsin.—Care When Passing Standing Cars.

Where a street car is passing a standing car discharging passengers, the motorman of the passing car is bound not only to have his car under full control but to keep a sharp lookout and give warning by bell, gong or whistle of its approach. (Coel v. Green Bay Traction Co., 133 N. W. Rep., 23.)

Wisconsin.—Injuries—Failure to Look—Special Findings—Contributory Negligence.

In an action for injuries by a person struck by a street car while crossing the track, the jury found that plaintiff's "failure to look in the direction of the coming car before entry upon the second track proximately contributed to his injury," and that when he stepped upon the second track the car was not so near and running at such speed that one of ordinary care, under the same circumstances, should have anticipated being struck by the car unless the speed was materially reduced, and that plaintiff was not guilty of want of ordinary care proximately contributing to the injury. Held, that the quoted phrase was equivalent to a finding that plaintiff should have reasonably apprehended that he might be injured. (Schliesleder v. Milwaukee Electric Ry. & Light Co., 134 N. W. Rep., 144.)

Wisconsin.—Injury on Platform Not Owned by Company—Obligations of Carriers.

One with the consent of an interurban railway company placed a platform on the right-of-way and running almost to the street line and attached steps thereto. The top step was partly on the right-of-way, while the remaining steps were wholly in the street. Cars stopped regularly at the platform to take on or let off passengers, and the only way to reach the street from the platform was by the steps or by going down a steep bank. The steps were with the knowledge and acquiescence of the company used by passengers to enable them to get to and from the street and were neither used nor intended for any other purpose. Held, that though the company had never repaired the platform or steps or assumed any control over them, it owed the non-delegable duty to its passengers to see that they were reasonably safe, and it was responsible for a defective condition of the steps resulting in injury to a passenger. (Carter v. Rockford & Interurban Ry. Co., 132 N. W. Rep., 598.)

News of Electric Railways

Approval of Electrification of Boston & Providence Railroad Urged Upon Directors

At the annual meeting of the Boston & Providence Railroad Corporation on Oct. 9, 1912, the stockholders will be asked to accept the act of the Legislature to authorize the New York, New Haven & Hartford Railroad to electrify the line between Boston and Providence. Along with the notices of the annual meeting a circular letter is being sent out, signed by Philip Dexter, George A. Gardner, Charles P. Bowditch, John C. Gray, Robert H. Gammell, Francis C. Welch and Robert H. Stevenson, as directors of the Boston & Providence Railroad. This letter says:

"Inclosed is a notice of the annual meeting, at which will be considered the approval of an agreement between you and the New York, New Haven & Hartford Railroad, the assignee of the lease from you, for the issue of bonds, not exceeding $8,000,000, by your company, and of the authorization of the issue of such bonds secured by a mortgage covering them and the bonds previously issued by your company, in accordance with the Statutes of 1912, Chapter 676. Your directors recommend that the provisions of this act be accepted for the following reasons:

"We have, not without regret, been becoming more and more convinced that if electrification is not undertaken by the railroads themselves they will be compelled to it by the Legislature, at whose will railroad charters can be amended, altered and repealed.

"We believe that it is wise for the railroads to forestall this danger by making the electrification themselves. The lessee has met us half way. It cannot be expected to electrify at its own expense, for all improvements on the road will become yours at the end of the lease (1987), but it has agreed, besides continuing the present rentals and payments, to furnish your company the money to pay the interest on the bonds, to establish a sinking fund which will extinguish the bonds before the termination of the lease, and to guarantee the payment of the bonds, principal and interest. It is clearly wise to undertake as part of the electrification the building of additional tracks and the elimination of grade crossings which the increase of the business now requires.

"The New York, New Haven & Hartford Railroad is to do all this work, receiving from your company so much of the proceeds of the $8,000,000 bonds as may be needed. But none of the bonds can be issued without the authority of the Railroad Commission.

"Your directors, therefore, recommend you to approve the issue of the bonds and mortgage."

Temporary Restraining Order Against Radical Portland Ordinance

Judge Bean, of the United States District Court, at Portland, Ore., has issued a temporary order restraining the city of Portland and the city attorney from enforcing the so-called strap-hanger ordinance and the ordinance providing a minimum rate for electricity.

The ordinances were to become effective on Sept. 20, 1912. The restraining order was returnable on Sept. 26. In its complaint filed with the court the company bases its plea for a restraining order against the operation of the "strap-hanger ordinance" on the ground that, besides being impracticable, certain of its provisions are in violation of the Constitution of the United States. The document recites the fact that the company now has 550 cars in operation in Portland, of many different styles and types, making it impossible to conform to certain provisions of the ordinance. The following provision in particular was held by the company to be unreasonable and impracticable:

"There shall be placed above the entrance of every street car in large letters words and figures indicating the seating capacity of the car, and when the conductor shall have rung up the number of fares equal to the capacity of the car, all other passengers carried shall be charged 3 cents, and if the number of passengers in the car falls below its seating capacity any person standing and who may have paid the 3-cent fare may take a seat vacated by other passengers without any extra charge."

It was also asserted that when the city charter was adopted pursuant to an act of the Legislature, a provision was included that nothing in the charter shall affect the validity of any franchise granted by the city previous to the adoption of the charter; that the franchise of the company provides that the rate of fare "shall not exceed 5 cents while traveling in any one general direction on the lines of said railway." Upon this fact is based the contention of a contractual condition between the city of Portland and the city railways as to the fare to be charged, and that the city in depriving the company of this right through the passage of the ordinance violated the terms of the agreement.

Councilman Maguire, author of the act, is quoted as follows in regard to his motives in introducing the act:

"'When I introduced the ordinance I at no time had believed that if passed it would be put into effect. My object was to force the company to place more cars in service during the congested periods and to provide better service for persons who are compelled to stand up when going home after their daily work. I feel certain that if the company relieves the situation in this manner the controversy between the City Council and the company can be settled easily."

Right to Operate Bridge Line Under Temporary Permit Denied

The Public Service Commission of the First District of New York has denied the request of the New York Railways and five other street railways of New York and Brooklyn for permission to operate a joint surface car service across the Manhattan Bridge over the East River under a temporary permit granted by the Bridge Commissioner on Feb. 29, 1912. This action was taken under an opinion by George S. Coleman, counsel to the commission, holding that the Bridge Commissioner has no authority to issue such a permit and that all franchises for street railway operation should be granted by the Board of Estimate and Apportionment. The Manhattan Bridge, although completed for two or three years, was not used for surface car service until this summer when the Manhattan Bridge Three Cent Line, a new corporation, perfected its rights to operate over the bridge. The old companies in New York and Brooklyn combined to form the Brooklyn & North River Railroad, which applied to the commission for a certificate of convenience and necessity to operate a line similar to the Three Cent Line across the Manhattan Bridge with transfers on each side of the East River to the New York and Brooklyn surface car lines. The same company applied in due course to the Board of Estimate and Apportionment for a franchise, but pending the grant of such franchise, which has not yet been made, the individual companies which combined to form the Brooklyn & North River Railroad obtained from the bridge commissioner a revocable permit to operate a car line over the bridge pending the grant of a franchise. At the direction of the court, the companies applied to the Public Service Commission for permission to operate under this temporary permit and this permission was denied. The Brooklyn & North River Railroad will now have to secure a franchise from the Board of Estimate and Apportionment and then obtain the permission and approval of the commission.

Inquiry Into Earnings Under Low Fare in Toledo

The officials of the Toledo Railway & Light Company, Toledo, Ohio, have agreed to allow the city to make a second examination of its books with particular reference to the period since last January. For two hours morning and evening the company has been carrying passengers at 3 cents each and for the remainder of the day has accepted tickets sold at the rate of six for 25 cents. The examination made by Carl Nau, which covered three months from Feb.

1, showed that the cost of carrying passengers was slightly in excess of 3 cents each. Mayor Whitlock feels that a fair test was not secured during the period for which Mr. Nau reported, as the low fare had been in effect only a short time and the weather was very unpleasant and tended to keep the traffic down.

J. R. Nutt, chairman of the bondholders' committee, and Dr. William H. Netherland, member of the stockholders' committee of the Toledo Railways & Light Company, conferred in Cleveland on Sept. 20, 1912, in regard to plans for refinancing the company.

Duluth Street Railway Strike Situation

Thirteen years ago the Duluth Street Railway had a strike in which it was successful and refused to take back any of the strikers. Since that time there has been no organization among its men, but the management has treated them as well as it knew how and has had every reason to believe that the men have been well satisfied. This spring the labor leaders in Duluth and Superior began a determined effort to organize the men. They met with little encouragement at first, as many of the employees had had bitter experience as members of labor unions and preferred to be independent of them. To meet the arguments made by the agitators that the men did not dare to make a request or suggestion to the management for betterment of conditions, last May the employees were requested to elect representatives with whom it took up all questions, making some concessions and explaining fully why others could not be made. At that time the men were told that the company could not raise wages. Nevertheless the employees, with the exception of nine or ten out of 260, appeared entirely satisfied. In July the company increased the wages of the men, not because there had been any demand since it had met the committee or because it had at that time the least fear of trouble, but merely because labor was scarce and the wages which were then being paid did not seem to attract as good men as were desired. This raise in wages pleased the men and greatly improved the friendly feeling already existing between the company and its employees. The outside labor agitators continued to urge the men to organize, and they succeeded in getting less than a dozen of the men to start an organization. Most of these men had for some time been known as trouble makers, and nine of them were discharged recently. A part of these were men who had held a secret meeting at the house of one of their number. While the management did not discharge all the men who were at the meeting and while it did discharge some who were not at the meeting, it was claimed that the sole cause of discharge was that the men had been detected holding the meeting.

On Monday morning, Sept. 9, Herbert Warren, general manager, was called out of bed at 3:30 a.m. with a demand from a committee of the newly formed organization that he come to the carhouse at 4:30 a.m. to meet them to consider the reinstatement of the men who had been discharged. He refused to confer with the committee, but went to the carhouse, where he found a small group of men intercepting other employees as they came to work. It appeared that the other employees knew nothing about the new organization, but by noon the agitators had succeeded in inducing perhaps thirty of the 200 men reporting at the carhouse to join with them. In spite of all that could be done to reassure other employees, the committee succeeded by evening in frightening half of the men into abandoning their work and shortly after dark violence began.

The following night, Sept. 10, there was more violence and the police department announced that it was unable to control the mobs. The sheriff was then called upon and he called on the Governor for the National Guard. The Governor in turn ordered the sheriff first to make an effort to control the mob or resign his position. The sheriff then appointed sufficient deputies to meet the situation in the daytime and for several nights the company kept its cars in the carhouse after dark. The service was badly crippled during the heat of the riot but has been increased greatly since, until now very nearly all the cars are in operation.

The men in Superior were not affected until Thursday, Sept. 12, but now all of the sixty conductors and motormen in that city, with the exception of about fourteen, have joined the strikers, and the company is manning its cars in that city largely with strikebreakers. There was severe rioting in Superior on the night of Sept. 19, and a number of cars were demolished by the mob. Since then, however, there has been no serious violence in either city.

Mandamus procedings to compel the company to resume service were begun in Duluth several days ago and in Superior Sept. 21. On the same day the strikers in Duluth were enjoined from further interference. On Sept. 24 Judge Homer Dibell, of the district court, filed his decision in the mandamus suit. In his decision he recommended that the street railway company furnish and run a sufficient number of cars to accommodate the traveling public on all lines in the city and resume the service which it had furnished prior to Sept. 9, 1912. The court held that the street railway could not be compelled to reinstate the strikers, nor could the strikers be compelled to go to work for the company. In rendering the decision Judge Dibell intimated that the street railway company or the city had the right to reopen the proceedings in case there was serious rioting.

Question of Temporary Track Rights in Pittsburgh

A special meeting of the Pittsburgh Council was held on Sept. 19, 1912, to reach an agreement with the Pittsburgh Railways in regard to the temporary turnouts which will be needed by the company in handling the traffic during the remainder of the removal of the hump when traffic is resumed on Fifth Avenue. No decision was reached. The question was raised at the meeting as to whether the company, if it were granted the desired turnouts in Fifth Avenue, would remove all the track that it was allowed to place at the time that the hump work was started and a piece of track in Fourth Avenue between Ross and Grant Streets, which has been down for a number of years. The Mayor claims that no franchise was ever granted to the company for the construction of the Fourth Avenue line.

The Mayor desired to make the removal of the track in Fourth Avenue one of the conditions in the ordinance which it is proposed to grant the company for temporary rights in Fifth Avenue. S. L. Tone, second vice-president of the company, said that he understood the plans for the work had been taken to the office of the Mayor and he supposed that the Mayor was familiar with the plans. The Mayor defined his attitude by saying: "In the near future I expect to introduce into Council an ordinance that will require the Pittsburgh Railways or any other company of a like nature to come before the Council and Mayor and get permission before it touches a stone in a city street. It has been asserted that I gave the company the permission that it wished, whereas at the time I vetoed the Diamond Street and other ordinances granting franchises. The authority to do this work never came from me. I am not in favor of acting on these grants until the Pittsburgh Railways makes plain its attitude in the matter of the proposed track removals."

Welfare Work of New York Railways

Referring to the welfare work of the company, Theodore P. Shonts, president of the New York Railways, said in presenting the report of the company recently for the six months ended June 30, 1912:

"Your company has among its employees a well organized association called the New York Railways Association, which now embraces about 4800 members. Membership costs but $1 with monthly dues of 50 cents, in return for which the members receive free medical attendance, a cash benefit of $1 per day during disability (not to exceed $90 in any one year), a life insurance policy of $300, an opportunity when in distress to borrow money without interest and the eligibility to a pension upon retirement.

"There is also a system of lunch rooms, operated under the supervision of the association, which affords employees an opportunity to purchase good wholesome food at reasonable prices; barber shop facilities at which the prices charged are less than the current rates; assembly rooms for recreation, equipped with billiard and pool tables, and

in addition a library and reading room, with a well-stocked library of books and magazines, both of a technical and general character.

"The pension system regulations heretofore followed have been continued in force by your company, and under their provisions employees who have attained a certain age receive pensions payable monthly, the amount of which is computed on the basis of the length of service and the average amount of wages received during the ten years previous to retirement.

"Your company has donated to the association the use of rooms in its various buildings, heat and light therefor and administration expenses, including the salary of the secretary of the association and his assistants."

Testimony in Hally Ordinance Suit in Detroit

For the greater part of the week ended Sept. 21, 1912, witnesses for the Detroit (Mich.) United Railway who were connected with the appraisal of the property were on the stand in the suit in the United States District Court at Detroit, Mich., over the Hally ordinance. The city is making an effort to discount in the appraisal the usual percentages added for overhead expenses, financing, engineering, etc.

At a recent meeting of the City Council Corporation Counsel Lawson was authorized to employ expert street railway witnesses in this case and send the bills to the city. Mr. Lawson desires especially to call witnesses to testify as to the valuation of the company's property. In his communication to the Council he stated that it would be necessary to do this because of the developments in the testimony which the company is offering.

The Cross-Tie Market

The Journal of Commerce and Commercial Bulletin, New York, said in its issue of Sept. 21: "The United States government's last purchase of cross ties to be delivered at Colon, Panama, was at $1.01¾ per tie. A year ago the government purchased ties at 78.8 cents per tie, which shows an advance of about 30 per cent in price. This is the first time ties have ever sold above $1. There is an unprecedented demand for ties in the North and East, as well as in foreign countries. Standard heart ties are now selling at 88 cents per tie, and sap ties, which are used for creosoting, at 70 cents per tie, delivered New York, Philadelphia and Baltimore. Dealers are behind time on their orders. This advance is partly due to advance in freight rates (ocean), but largely to the scarcity of cross-tie stumpage, the timber dealers realizing much more from standing timber by selling it to the sawmills, which can afford to pay so much more than the cross-tie manufacturer. It is expected that ties will be selling within a short time at $1 per tie for hearts and 80 cents per tie for saps, delivered New York, Philadelphia or Baltimore. There are inquiries on the market to-day for cross-ties amounting to at least several million ties."

New Indiana Road Opened.—The Gary, Hobart & Eastern Traction Company opened its line for service on Sept. 21, 1912.

Joplin Strike Settled.—The differences between the employees of the Joplin & Pittsburgh Railway and the management of the company were adjusted on Sept. 14, 1912, and the men who went on strike on Sept. 10, 1912, have returned to work.

Double-Deck Car at Chicago.—The New York (N. Y.) Railways has withdrawn its double-deck car from service and has loaned it to the Prepayment Car Sales Company, New York, N. Y., which will exhibit the car at the convention of the American Electric Railway Association at Chicago.

Cleveland Railway to Relocate Shops.—The Cleveland (Ohio) Railway will ask the City Council for permission to sell the Lakeview repair shops at Euclid Avenue and Coltman Road and the carhouses at Superior Avenue and 105th Street in order to secure greater facilities in locations more remote from the business sections of the city. Shops to replace those which will be sold will be established on Harvard Avenue at its junction with Independence Road, where the company has secured a tract of 16 acres of land. At a recent meeting of the City Council an ordinance authorizing tracks on Harvard Avenue S. E. and Denison Avenue S. W. was introduced. This line will connect the far southwestern section of the city with the Newburg section.

Additional Subway Construction Contracts Awarded in New York.—The Public Service Commission for the First District of New York has awarded five additional contracts for construction work on the dual system of rapid transit, aggregating $8,292,721. The Board of Estimate and Apportionment has approved the contracts and appropriated the money, so that the contracts will soon be executed and within sixty days thereafter the contractors will begin work. These five sections are all for subway work. Two of them are on the Broadway subway in lower Manhattan, two on the extension of the Fourth Avenue subway in Brooklyn, and one on the Southern Boulevard and Westchester Avenue branch of the Lexington Avenue line. The two Broadway contracts were let to F. L. Cranford, Brooklyn, for $1,222,269 for Section 1 and $982,740 for Section 1-A. The Degnon Contracting Company, New York, was awarded the contract for the two sections of the Fourth Avenue subway extension in Brooklyn on bids of $1,930,258 for Section 1 and $1,904,171 for Section 2. The contract for the section in the Bronx on the Southern Boulevard was let to the John F. Stevens Construction Company, New York, for $2,253,281. These were the lowest bidders in each case.

PROGRAMS OF ASSOCIATION MEETINGS

Association of Railway Electrical Engineers

The fifth annual convention of the Association of Railway Electrical Engineers will be held in the Auditorium Hotel, Chicago, Ill., Oct. 21-25. The hall occupying the ninth floor of the hotel has been reserved for the exhibit.

Railway Signal Association

The seventeenth annual convention of the Railway Signal Association will be held at the Chateau Frontenac, Quebec, Can., on Oct. 8, 9 and 10, 1912. The following program of papers and reports has been announced for presentation:

OCTOBER 8

Report of Committee II—Mechanical interlocking.
Report of Committee III—Power interlocking.
Report of Committee IV—Automatic block.
Report of Committee V—Manual block.
Report of Committee VIII—Electric railways and a.c. signaling.
Report of special committee—Storage battery.

OCTOBER 9

Report of Committee I—Signaling practice.
Report of Committee VI—Standards.
Report of Committee VII—Subjects and definitions.

OCTOBER 10

Report of Committee IX—Wires and cables.
Report of special committee—Contracts.
Report of special committee—Method of recording signal failures.

The committee on electric railway a.c. signaling was instructed last year to continue its investigation of the various systems using a.c. current in railway signaling. The committee will present historical facts concerning the various installations throughout the United States as well as in Europe as a matter of information to the association.

The committee on definitions will present for final action and approval 300 definitions of words, terms and phrases, and states that since the appointment of the committee it has covered a great deal more ground than is represented by the definitions submitted, a large number having been tentatively prepared which are not sufficiently advanced to be offered at this time. The committee's work has been carried on with the view that the results would comprise a signal dictionary when completed. The committee will ask that it be continued for another year.

Financial and Corporate

Stock and Money Markets

Sept. 25, 1912.

Until the final hour of trading on the New York Stock Exchange to-day there had been no abatement of the buying which has been carrying the market forward for the last ten days. In the early morning hours to-day many new high prices for the year were established, but there was a sharp break as a result of a rise in call money to 7 per cent. Some of the largest lenders of money found it necessary to call loans to strengthen their reserves against large cash withdrawals. Rates in the money market to-day were: Call, 5@7 per cent; thirty days to six months, 5½ per cent bid.

In Philadelphia the market was very broad and active. In the morning American Railways advanced 2 points. Electric Storage Battery was also active.

The volume of business on the Chicago Exchange was not so great as that on Tuesday, but there were small gains in a large number of issues.

In the Boston market the trading in the railroad issues was light. Massachusetts Electric issues were prominent.

The Baltimore market was broader. The market for bonds was active, the total sales to-day amounting to $67,000.

Quotations of traction and manufacturing securities as compared with last week follow:

	Sept. 18.	Sept. 25.
American Brake Shoe & Foundry (common)	a97½	a99½
American Brake Shoe & Foundry (preferred)	152	157
American Cities Company (common)	a32	31¼
American Cities Company (preferred)	77½	77⅜
American Light & Traction Company (common)	a428	*428
American Light & Traction Company (preferred)	a112	a112
American Railways Company	a44¼	a46½
Aurora, Elgin & Chicago Railroad (common)	a46½	a46
Aurora, Elgin & Chicago Railroad (preferred)	88	a88
Boston Elevated Railway	125	a125
Boston Suburban Electric Companies (common)	a15	a15
Boston Suburban Electric Companies (preferred)	a78	a78
Boston & Worcester Electric Companies (common)	*10	*10
Boston & Worcester Electric Companies (preferred)	a53	a53
Brooklyn Rapid Transit Company	90¼	91⅜
Capital Traction Company, Washington	126	*126
Chicago City Railway	a170	a157
Chicago Elevated Railways (common)	a35	a35
Chicago Elevated Railways (preferred)	a92	a92
Chicago Railways, ptcptg., ctf. 1	a90	a90
Chicago Railways, ptcptg., ctf. 2	a25⅛	a23½
Chicago Railways, ptcptg., ctf. 3	a9¼	a9
Chicago Railways, ptcptg, ctf. 4	a4¼	a4¼
Cincinnati Street Railway	a131	a130
Cleveland Railway	a104¾	a105
Cleveland, Southwestern & Columbus Ry. (common)	*7	*7
Cleveland, Southwestern & Columbus Ry. (preferred)	*34	*34
Columbus Railway & Light Company	a55	a55
Columbus Railway (common)	a85	a70
Columbus Railway (preferred)	a95	a90
Denver & Northwestern Railway	a125	*125
Detroit United Railway	70	70
General Electric Company	182¾	183¼
Georgia Railway & Electric Company (common)	a125¼	124½
Georgia Railway & Electric Company (preferred)	a85	a85
Interborough Metropolitan Company (common)	20⅛	20⅜
Interborough Metropolitan Company (preferred)	60¼	60¾
International Traction Co., Buffalo, 4% bond rcts	*75	*75
Kansas City Railway & Light Company (common)	a17½	a22
Kansas City Railway & Light Company (preferred)	a38½	a45
Lake Shore Electric Railway (common)	*8½	*8½
Lake Shore Electric Railway (1st preferred)	*93	*93
Lake Shore Electric Railway (2d preferred)	*28	a28
Manhattan Railway	131⅝	a133⅛
Massachusetts Electric Companies (common)	a19¼	a19¼
Massachusetts Electric Companies (preferred)	a77	a79
Milwaukee Electric Railway & Light (preferred)	102	102
Norfolk Railway & Light Company	28	*28
North American Company	84	85¼
Northern Ohio Light & Traction Company (common)	a70	a70
Northern Ohio Light & Traction Company (preferred)	a105	a105
Philadelphia Company, Pittsburgh (common)	a51¾	a52½
Philadelphia Company, Pittsburgh (preferred)	a44½	a44½
Philadelphia Rapid Transit Company	a28⅞	a28½
Portland Railway, Light & Power Company	66	66
Public Service Corporation	a120	a120
Third Avenue Railway, New York	36	36¾
Toledo Railway & Light Company	a6	a4¾
Twin City Rapid Transit Co., Minneapolis (common)	a110	a109¾
Union Traction Company of Indiana (common)	14	14
Union Traction Company of Indiana (1st preferred)	88	88
Union Traction Company of Indiana (2d preferred)	40	*40
United Rys. & Electric Company (Baltimore)	...	*25¾
United Rys. Inv. Company (common)	32¾	a33
United Rys. Inv. Company (preferred)	61½	a61¾
Virginia Railway & Power Company (common)	*50½	*50¼
Virginia Railway & Power Company (preferred)	a87½	a87½
Washington Ry. & Electric Company (common)	a93¼	*93¼
Washington Ry. & Electric Company (preferred)	a96¼	*96¼
West End Street Railway, Boston (common)	a85	a82½
West End Street Railway, Boston (preferred)	a99	a98½
Westinghouse Elec. & Mfg. Company	a84⅞	85½
Westinghouse Elec. & Mfg. Company (1st preferred)	a130	a130

* Last sale. a Asked.

ANNUAL REPORT

Interborough-Metropolitan Company

The statement of the operations of the Interborough-Metropolitan Company, New York, N. Y., for the fiscal year ended June 30, 1912, follows:

Surplus balance of income account, June 30, 1911		$681,500
INCOME		
Dividends on Interborough Rapid Transit Company capital stock, viz:		
1 per cent extra for the year ended June 30, 1911	$339,128	
2½ per cent for three months ended Sept. 30, 1911	847,820	
2½ per cent for three months ended Dec. 31, 1911	847,820	
2½ per cent for three months ended March 31, 1912	847,820	
5 per cent extra June 19, 1912	1,695,640	
2½ per cent for three months ended June 30, 1912	847,820	
	$5,426,048	
Interest on loans and advances to Metropolitan Securities Company	$325,565	
Interest on bank balances	2,217	
	$327,782	5,753,831
Total		$6,435,331
DISBURSEMENTS		
Interest on $67,825,000 Interborough-Metropolitan Company 4½ per cent collateral trust bonds for the year ended June 30, 1912	$3,052,125	
Administration and general expense account	$94,995	
Taxes	29,873	
	$124,868	
Interest on two-year 6 per cent registered notes to Dec. 31, 1911	76,482	
Interest on one-year 6 per cent registered notes to June 30, 1912	61,185	
Interest on five-year 6 per cent notes	240,000	
Interest on two-year 6 per cent secured gold notes	54,849	
Interest on loans	19,013	
	$451,529	
Total		$3,628,523
Surplus income		$2,806,807

Theodore P. Shonts, president of the company, said in part:

"Owing to the changes brought about at the end of the calendar year of 1911 by the reorganization of the surface lines, and for the purpose of meeting the requirements of the New York Stock Exchange, it has been found necessary to change our report from the calendar year to the fiscal year ended June 30, 1912.

"On Nov. 28, 1911, your company decided to participate in the plan formulated by the joint bondholders' committee of the Metropolitan Street Railway general and collateral mortgage 5 per cent bonds and refunding mortgage 4 per cent bonds for the reorganization of that company, whereby a new company was to be organized and its securities issued in exchange for those of the street railway.

"In conformity therewith the New York Railways Company was incorporated on Dec. 29, 1911, under the stock corporation law of the State of New York, for the purpose of taking possession of the property and franchises which formerly belonged to the Metropolitan Street Railway. The new company issued its securities as follows:

Stock	$17,500,000
First real estate and refunding mortgage 4 per cent bonds	16,299,167
Adjustment mortgage 5 per cent income bonds	30,629,177

"Of these securities there have been acquired by or on account of your company, by virtue of its participation in the reorganization plan of the Metropolitan Street Railway, the following securities of the new company:

Stock	$15,256,743
First real estate and refunding mortgage 4 per cent bonds	4,358,364
Adjustment mortgage 5 per cent income bonds	2,616,006
Total	$22,231,113

"The foregoing participation required a cash contribution by your company of $6,367,259. In order to relieve the company of the necessity of borrowing so large a sum in cash, the first mortgage and adjustment bonds were disposed of in connection with the financial arrangement, thus reducing the net amount required to be borrowed by your company, as aforesaid, to $1,817,000.

"The Interborough-Metropolitan Company, as the controlling owner of the New York Railways Company, the newly organized operating company of the surface lines of the old Metropolitan Street Railway System, possesses a valuable property of great earning possibilities, embracing all the equities in perpetual street railway franchise rights,

ownership of considerable valuable real estate and long-term leasehold privileges of eleven important street railway companies.

"The first six months' operation of the new company exhibits a gratifying growth from month to month in gross revenue and some economies of operating cost which will necessarily be better demonstrated by a full year period of operation. It is expected also that the contemplated rearrangement of terminals and the release of costly property not required for operating purposes, together with the adoption of the new improved type of surface cars and the ultimate payment into the treasury of the company, as the principal creditor of the Metropolitan or New York City receiverships, of a considerable portion of the large funds, aggregating $7,000,000, now in the hands of the court, will contribute largely to the increased net revenues of the company.

"The gross operating revenue of the Interborough Rapid Transit Company for the year ended June 30, 1912, amounted to $31,246,392, an increase of $1,479,040 over the previous year. After the payment of all charges the net income (exclusive of the $900,000 received from the dividend on the capital stock of the Rapid Transit Subway Construction Company) was $5,623,766, equivalent to 16.07 per cent upon the capital stock of the company as against 14.68 per cent the previous year. From this amount must be deducted the regular dividend of 10 per cent, leaving a net surplus from operations of the year of $2,123,766.

"The total number of passengers carried for the year was 607,244,697, an increase of 20,090,609. Owing to the lengthening of the station platforms and the inauguration of ten-car train service, the capacity of the subway was increased considerably during the past year so that the increase in the number of passengers carried represents the natural growth of travel following improved accommodations."

Cincinnati (Ohio) Traction Company.—On Sept. 18, 1912, the application of the Cincinnati Traction Company for authority to issue $340,000 of car trust certificates was heard by Oliver H. Hughes, of the Public Service Commission. The company was represented by George H. Warrington, attorney, and Walter A. Draper, secretary. They explained that as a result of the study which has been made of operating conditions in Cincinnati seventy-six new cars will be purchased. These cars will cost $456,000. The plan of the company is to pay $116,000 in cash to be charged to the capital account and to issue 5 per cent car trust certificates to cover the balance, the trust certificates to run for ten years and to be paid off at the rate of $17,000 semi-annually out of the earnings.

Danville Traction & Power Company, Danville, Va.—Townsend, Scott & Son, Baltimore, Md., are offering for subscription $400,000 of first mortgage 5 per cent bonds of the Danville Traction & Power Company. These bonds are redeemable at 107 and accrued interest upon any interest date. The Maryland Trust Company is the trustee.

Dayton, Covington & Piqua Traction Company, West Milton, Ohio.—The Dayton, Covington & Piqua Traction Company has applied to the Public Service Commission of Ohio for authority to issue $400,000 of bonds to provide funds to extend the line from Covington to Bradford and Loramie.

Gary & Interurban Railway, Gary, Ind.—The Gary & Interurban Railway is reported to have arranged to float in London a loan for $4,000,000 to provide funds to extend the company's lines. The main line of the Gary & Interurban Railway runs from Gary and the steel works to Indiana Harbor and Whiting and is to be extended to South Chicago, making direct connections with surface lines in South Chicago.

Kansas City Railway & Light Company, Kansas City, Mo.—The committee composed of John B. Dennis, Samuel L. Fuller, James J. Storrow and Paul M. Warburg, representing the holders of the 6 per cent notes of the Kansas City Railway & Light Company which matured on Sept. 1, 1912, has extended indefinitely the time for the deposit of the notes under the agreement of deposit dated Aug. 15, 1912.

Mount Vernon (Ohio) Electric Railway.—The Mount Vernon Electric Railway has applied to the Public Service Commission of Ohio for authority to purchase the property of the Mount Vernon Electric Company which it has operated under lease for several years.

Northwestern Ohio Railway & Power Company, Toledo, Ohio.—The Northwestern Ohio Railway & Power Company has applied to the Public Service Commission of Ohio for permission to purchase the property of the Port Clinton Electric Light & Power Company for $30,000.

Pacific Gas & Electric Company, San Francisco, Cal.—The Pacific Gas & Electric Company has sold $5,000,000 of additional general and refunding 5 per cent bonds, making the total amount outstanding $25,000,000. A part of the proceeds will be applied to purchase the property of the Los Gatos Ice, Gas & Electric Company, but most of the proceeds will be used in the Bear Valley hydroelectric development.

Sapulpa & Interurban Railway, Sapulpa, Okla.—The Sapulpa & Interurban Railway has been placed in the hands of R. V. Miller as receiver.

Seattle, Renton & Southern Railway, Seattle, Wash.—Augustus H. Peabody, of Peabody, Houghtaling & Company, Chicago, Ill., as trustee under the mortgage of the Seattle, Renton & Southern Railway of 1908, has brought suit in the Superior Court to foreclose the mortgage. There are $825,000 of bonds outstanding, on which interest was defaulted on May 1, 1912.

Springfield, Clear Lake & Southern Railway, Springfield, Ill.—The directors of the Springfield, Clear Lake & Southern Railway, which has succeeded the Springfield, Clear Lake & Rochester Interurban Railway, have announced that Clear Lake will be operated as a summer resort and that the line will be extended from Rochester to Hillsboro. The line between Springfield and the first bridge is to be put into operation at once. As fast as the bridges which were declared unsafe by the Illinois Railroad & Warehouse Commission are made safe the operation of the road will be extended. Officers have been elected as follows: N. R. Gordon, Springfield, president; W. R. Thompson, Springfield, vice-president; H. L. Metcalf, Springfield, secretary; G. B. Hemmenway, Springfield, treasurer. The officers, together with G. W. Brown, Rochester, compose the board of directors.

Washington, Baltimore & Annapolis Electric Railway, Baltimore, Md.—An initial dividend of 1½ per cent has been declared on the $1,460,000 of 6 per cent non-cumulative preferred stock of the Washington, Baltimore & Annapolis Electric Railway, payable on Oct. 1, 1912, to holders of record of Sept. 24.

Washington Railway & Electric Company, Washington, D. C.—Clarence P. King, president of the Washington Railway & Electric Company, is quoted as follows in regard to the plans of the Maryland-Virginia Company, referred to in the Electric Railway Journal of Sept. 21, 1912, page 467: "We have no intention of attempting to take over the Capital Traction Company, the Washington Gas Light Company, the Chesapeake & Potomac Telephone Company, or any other public utility corporation in the District not now allied with us. We are simply seeking to find a way to look out for the future of our own properties in a manner big and broad enough to suit the expansion we are sure is to come in the District of Columbia."

Dividends Declared

Asheville Power & Light Company, Asheville, N. C., quarterly, 1¾ per cent, preferred.

Augusta-Aiken Railway & Electric Company, Augusta, Ga., quarterly, 1½ per cent, preferred.

Aurora, Elgin & Chicago Railroad, Wheaton, Ill., quarterly, 1½ per cent, preferred; quarterly, ¾ of 1 per cent, common.

Bangor Railway & Electric Company, Bangor, Me., quarterly, 1¾ per cent, preferred.

Carolina Power & Light Company, Raleigh, N. C., quarterly, 1¾ per cent, preferred.

Cincinnati & Hamilton Traction Company, Cincinnati, Ohio, quarterly, 1¼ per cent, preferred; quarterly, ⅞ of 1 per cent, common.

Cincinnati (Ohio) Street Railway, quarterly, 1½ per cent.

Cleveland (Ohio) Railway, quarterly, 1½ per cent.

Germantown Passenger Railway, Philadelphia, Pa., quarterly, $1.31¼.

Halifax (N. S.) Electric Tramway, Ltd., quarterly, 2 per cent.

Houghton County Traction Company, Houghton, Mich., 3 per cent, preferred; 2½ per cent, common.

Kokomo, Marion & Western Traction Company, Kokomo, Ind., 3 per cent, preferred.

Metropolitan West Side Elevated Railway, Chicago, Ill., quarterly, ¾ of 1 per cent, preferred.

New Orleans Railway & Light Company, New Orleans, La., quarterly, 1¼ per cent, preferred.

New York State Railways, Rochester, N. Y., quarterly, 1¼ per cent, preferred; quarterly, 1½ per cent, common.

Ottawa (Ont.) Electric Railway, quarterly, 3 per cent.

Pacific Gas & Electric Company, San Francisco, Cal., quarterly, 1¼ per cent, common.

Philadelphia Company, Pittsburgh, Pa., quarterly, 1¾ per cent, common.

Philadelphia (Pa.) Traction Company, 2 per cent.

Puget Sound Traction, Light & Power Company, Seattle, Wash., quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

Republic Railway & Light Company, Youngstown, Ohio, quarterly, 1½ per cent, preferred.

Ridge Avenue Passenger Railway, Philadelphia, Pa., quarterly, $3.

South Side Elevated Railroad, Chicago, Ill., quarterly, 1⅛ per cent.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., quarterly, 1¼ per cent, preferred.

Tri-City Railway & Light Company, Davenport, Ia., quarterly, 1½ per cent, preferred.

Washington, Baltimore & Annapolis Electric Railway, Baltimore, Md., 1½ per cent, preferred.

Washington Water Power Company, Spokane, Wash., quarterly, 2 per cent.

Western Ohio Railway, Lima, Ohio, quarterly, 1¾ per cent, first preferred; quarterly, 1½ per cent, second preferred.

West India Electric Company, Ltd., Kingston, Jamaica, quarterly, 1¼ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAYS

Period.			Gross Earnings.	Operating Expenses.	Net Earnings.	Fixed Charges.	Net Surplus.
1m.,	Aug.,	'12	$450,563	.....	.....	.....	.....
1 "	"	'11	427,586	.....	.....	.....	.....
2 "	"	'12	901,320	.....	.....	.....	.....
2 "	"	'11	870,826	.....	.....	.....	.....
BATON ROUGE ELECTRIC COMPANY							
1m.,	July,	'12	$12,480	*$8,101	$4,378	$1,729	$2,649
1 "	"	'11	9,476	*6,399	3,077	1,729	1,348
12 "	"	'12	137,813	*83,253	54,561	20,758	33,802
12 "	"	'11	114,034	*73,656	40,378	20,677	19,701
CAPE BRETON ELECTRIC COMPANY							
1m.,	July,	'12	$33,116	*$16,974	$16,142	$5,703	$10,439
1 "	"	'11	31,216	*16,385	14,831	5,653	9,178
12 "	"	'12	348,338	*192,034	156,304	67,980	88,324
12 "	"	'11	332,935	*177,658	155,278	67,838	87,440
COLUMBUS (GA.) ELECTRIC COMPANY							
1m.,	July,	'12	$51,575	*$23,278	$22,272	$18,952	$3,320
1 "	"	'11	43,849	*20,338	20,338	17,190	3,148
12 "	"	'12	599,047	*267,659	254,707	223,427	31,280
12 "	"	'11	521,610	*221,156	249,754	176,728	73,026
DALLAS ELECTRIC CORPORATION							
1m.,	July,	'12	$144,534	*$88,839	$55,695	$24,666	$31,029
1 "	"	'11	125,037	*87,836	37,201	19,767	17,434
12 "	"	'12	1,728,517	*1,106,421	622,096	264,752	357,344
12 "	"	'11	1,559,557	*1,040,559	518,998	249,614	269,384
EL PASO (TEX.) ELECTRIC COMPANY							
1m.,	July,	'12	$59,620	*$36,327	$23,293	$5,876	$17,417
1 "	"	'11	51,834	*32,361	19,472	6,734	12,738
12 "	"	'12	737,955	*412,355	325,600	81,267	244,333
12 "	"	'11	667,937	*405,570	262,368	80,213	182,155
GALVESTON ELECTRIC COMPANY							
1m.,	July,	'12	$47,652	*$23,856	$23,796	$7,778	$16,018
1 "	"	'11	44,763	*22,195	22,568	6,894	15,674
12 "	"	'12	458,740	*262,315	196,425	91,521	104,904
12 "	"	'11	414,212	*238,381	175,831	83,607	92,224
JACKSONVILLE TRACTION COMPANY							
1m.,	July,	'12	$49,248	*$33,100	$16,147	$9,810	$6,337
1 "	"	'11	43,920	*27,730	16,190	9,212	6,979
12 "	"	'12	584,690	*367,169	217,521	113,409	104,112
12 "	"	'11	578,831	*358,626	220,204	85,385	134,819
PUGET SOUND TRACTION, LIGHT & POWER COMPANY							
1m.,	July,	'12	$713,526	*$415,078	$298,448	$163,105	$135,343
7 "	"	'12	4,798,094	*2,784,378	2,013,716	1,131,778	881,938

*Includes taxes.

Traffic and Transportation

Radical Change in Schedule of the Rochester, Syracuse & Eastern Railroad

An important change in the time schedules of the Rochester, Syracuse & Eastern Railroad, Syracuse, N. Y., to become effective on Oct. 1, 1912, was determined upon recently at a conference of executive, traffic and operating officials of the Beebe electric railway system. The schedule approved at the conference provides for an hourly fast electric limited train leaving Rochester and Syracuse from 7 a. m. to 7 p. m. inclusive daily. This is double the present limited service. The distance between terminals on the Rochester, Syracuse & Eastern Railroad is 86 miles. The Auburn & Northern Electric Railroad, which is a part of the system and forms the connecting link between Auburn and the Rochester, Syracuse & Eastern Railroad, will also inaugurate a new schedule on Oct. 1 in order to provide close connections with the new hourly limited service on the latter line. In connection with the limited schedule there will also be maintained a frequent local service which will be different from the present local schedule in some respects but will afford practically the same volume of local service given by the present schedule. The details of the local time card have not yet been fully completed. In connection with the consideration of the new schedule, the railroad officials have also in mind a plan to inaugurate a fast through parlor-car service between Rochester and Syracuse, but no definite decision regarding this feature has been reached. This service probably will not be installed until later in the fall.

With a view to a general improvement in service it has also been definitely decided to change the present interior arrangement of all cars on the Rochester, Syracuse & Eastern Railroad. If the alterations which are proposed meet with public approval they will be installed on all of the other lines in the system including the Syracuse, Lake Shore & Northern Railroad and the Auburn & Syracuse Electric Railroad. Important among the changes agreed upon is an improved car heating and ventilating system. Tests are to be made with a number of systems in an effort to adopt the most effective design. A new type of parcel rack is to be adopted. At present the racks are so narrow that the company will not permit passengers to put suitcases in them, whereas the rack which it is proposed to install will carry any large case or package in safety. More effective cleaning of cars at the end of each trip is also to be arranged. Owing to the short lay-over at the end of each run provided in the new schedule an extra car will be kept at terminals so that fresh, clean equipment can be used constantly. Water tanks to supply water for drinking will be installed in all cars at the earliest possible moment—no drinking water being provided at present. The officials who attended the conference at which these changes were decided upon were C. D. Beebe, president and general manager; R. A. Dyer, Jr., assistant general manager; T. H. Mather, chief engineer; H. J. Clark, traffic manager; H. C. Beatty, secretary; P. E. Emerson, superintendent of transportation; A. J. Littlejohn, assistant traffic manager, and J. S. Moore, general passenger agent.

The company will conduct an advertising campaign in Rochester and Syracuse in behalf of the new service. Newspapers, street cars, billboards and posters will be used in each city.

Novel Publicity Campaign of the Illinois Traction System

The Illinois Traction System has introduced a novel publicity campaign in order that its patrons may have an opportunity to suggest methods of bettering the service. Bulletins have been displayed in all the stations and the newspapers in the various cities along the Illinois Traction System lines have been supplied with the following information to be run from Sept. 23 until the time for holding the Illinois State Fair, which is the second week in October:

"The Illinois Traction System is going to pay its patrons for suggestions. Any suggestion relating to any depart-

ment of the interurban operation of the Illinois Traction System is acceptable, and those that can be used will be paid for in accordance with their merit and acceptability. Here is the chance for amateur railroad superintendents, patrons with kicks and everyone interested to furnish suggestions and get paid for so doing.

"During the week of the State Fair the bars will be let down and all ideas welcomed. Every meritorious idea received that is usable will be paid for in proportion to its worth. This goes for everybody, and the officials hope to receive some new ideas from the standpoint of the man who rides.

"Vice-president Executive H. E. Chubbuck is the originator of the scheme and he believes the results will be beneficial. A ballot box will be installed at the Illinois Traction building on the State fair grounds. During the entire week this will be open for the reception of ideas. Every traction agent will be supplied with proper blanks and these will be furnished to everyone during fair week. After the fair these suggestions will be sorted and distributed to the various departments to which they apply, and the department heads will report to Mr. Chubbuck the ones that can be used. Liberal payment will be made for ideas that are utilized.

"'Sometimes things beneficial from the standpoint of service can be pointed out by daily patrons of the line,' said Mr. Chubbuck. 'We are trying to do everything possible to give good service and will appreciate suggestions that will help out. People who ride on the road often see little things that can be changed or places where the service can be improved, and these are things we want to know and are willing to pay for. During the State fair we have more of our customers together than any other time during the year and we are going to ask them to let us know what can be done to improve our service. We have a building on the State Fair grounds and the suggestions will be received there. Our agents will furnish blanks.'"

The following advertisement is receiving prominence in the daily paper along the company's lines:

"The Illinois Traction System will pay for your ideas during State Fair week. We want your suggestions so badly that we will pay for them. We do everything possible to justify our motto of the 'Road of Good Service,' but we want you to help us do better. We want the viewpoint of the customer of the road.

"Every usable idea will be paid for. During State Fair week every Illinois Traction agent will supply patrons with proper stationery for recording suggestions. Fill these out and deposit them in a ballot box provided for the purpose at the Illinois Traction System building on the State Fair grounds. Suggest anything and everything pertaining to the interurban operation, cars, service, advertising, schedules, track, stations, freight. Everything goes, and we will pay for every good idea. The Illinois Traction System, 'the State Fair Route.'"

Interlocker at Princeton, Ind.—A tower-operated interlocker has been established jointly at Princeton Ind., by the Chicago & Eastern Illinois Railroad, the Southern Railway and the Evansville & Southern Indiana Traction Company.

Car Hold-up in California.—On Sept. 17, 1912, two masked highwaymen held up three San Mateo suburban cars of the United Railroads, San Francisco, Cal., shot City Attorney Charles N. Kirkbride, of San Mateo, and robbed the conductors and passengers.

Petition to I. C. C. in Regard to Louisville-Indianapolis Freight Rates.—The Louisville Board of Trade has asked the Interstate Commerce Commission to require the Indianapolis, Columbus & Southern Traction Company to establish satisfactory freight rates between Louisville and Indianapolis and other points.

Fare Complaint Against Washington & Old Dominion Railroad.—Commuters who reside along the Great Falls branch of the Washington & Old Dominion Railroad, Washington, D. C., have filed a complaint with the Interstate Commerce Commission against the rates established by the company on its Great Falls branch.

Readjustment of Freight Rates.—There is to be a general readjustment by the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., on Oct. 3, 1912, of the rates for the transportation of general commodities of freight between local stations. The schedule of reissues and reductions has been filed with the Public Service Commission of the Second District.

Endless Chain Ticket Scheme Stopped in Louisville.—The Cut-Rate Car-Fare Company has been prevented from doing business in Louisville, Ky., by the order of Chief of Police H. Watson Lindsey. This action comes subsequent to a similar order issued by the chief of police in Indianapolis, Ind. The Cut-Rate Car-Fare Company offered to the public on the endless chain plan thirty tickets for 25 cents good on any line in Louisville.

Near-Side Car Service on Main Street, Buffalo.—The International Railway, Buffalo, N. Y., has placed near-side cars in service on the Main Street line. All cars which operate in Main Street stop on signal to receive and discharge passengers at the near crossing, except where "Cars stop here" signs are displayed on the span wire. The Main Street cars are designated by a large figure 8. The company now has 162 near-side cars in operation.

Decision in Regard to Stops on the Lake Shore Electric Railway.—Judge Scott Stahl of the Common Pleas Court of Erie County, Ohio, rendered a decision on Sept. 17, 1912, to the effect that the Lake Shore Electric Railway, Cleveland, is not obliged to stop its cars in Vermilion. Some time ago, when the cars were run through without being stopped, F. W. Coen, general manager of the company, was fined $10 and costs in the police court. He appealed the case.

Suit to Prevent Enforcement of Seats-for-Motormen Ordinance.—The South Covington & Cincinnati Street Railway, Newport, Ky., has filed suit before Circuit Judge Yungblut in that city to have declared unconstitutional the ordinance which the Newport Board of Commissioners seeks to enforce, providing for the seating of motormen employed on the company's lines. The company maintains that its accident risk would be increased through adoption of the proposed policy.

Service to the Races at Louisville.—The Louisville (Ky.) Railway is being complimented upon the excellence of the service it is maintaining during the fall racing season. The company runs a car over the Third Street division of the Fourth Avenue line to the race course at Douglas Park in South Louisville every minute from 1 p. m. to 2 p. m., and from 5 p. m. to 6 p. m. Similar arrangements will be in force for the nine-day meet which will open at Churchill Downs on Oct. 9.

Proposed Hourly Limited Service Between Cleveland and Akron.—Charles Currie, manager of the Northern Ohio Traction & Light Company, Akron, Ohio, has announced that within a short time an hourly limited service will be established between Cleveland and Akron. The running time of the trains will be one hour and thirty-five minutes. This will be reduced about fifteen minutes when the Macedonia cut-off is completed. The hourly service will continue from 7:30 a. m. until 7:30 p. m.

From the Horse Car to the Prepayment Car in Detroit.—The Detroit (Mich.) United Railway Company in one of its recent daily newspaper advertisements reviewed the history of the development of the rolling stock used on the lines within the past twenty years. It illustrated the advertisement with engravings of the old horse cars and the prepayment cars which have just been adopted, and closed the advertisement with a comparison of the cost of the various types of cars that have been used within the twenty-year period.

Newspaper Excursions by Aurora, Elgin & Chicago Railroad.—The Aurora, Elgin & Chicago Railroad, Wheaton, Ill., contracted recently with the Chicago *Evening American* to supply the paper with tickets for excursions advertised for certain days during the week. Usually the trip is arranged to a certain point on the line, but special rates are offered as an inducement to extend the trip to points at the ends of the line. Coupons are printed in certain editions of the *Evening American* every day. These coupons and the sum of money mentioned in the advertisement, when presented at the office of the newspaper or sent by mail, entitle the holder to the reduced rate.

Personal Mention

Mr. Albert Fearyear has been appointed master mechanic for the Saginaw & Flint Railway, Saginaw, Mich., to succeed Mr. George R. Green, who resigned to accept a position with the Detroit (Mich.) United Railway.

Mr. N. H. Brown has been appointed superintendent of the Albany Southern Railroad, with headquarters at Rensselaer, N. Y. Mr. Brown entered railway work with the Syracuse (N. Y.) Rapid Transit Railway in March, 1894, and continued with the company until February, 1907, holding the positions of conductor, motorman, cashier and inspector. He next became general inspector with the Worcester (Mass.) Consolidated Street Railway, and on Sept. 1, 1907, was promoted to the position of superintendent of the Southbridge division of that company, which position he held until Sept. 15, 1912, when he resigned to become superintendent of the Albany Southern Railroad. A gold watch chain and a Masonic charm studded with diamonds were presented to Mr. Brown by his associates on the Worcester Consolidated Street Railway as a token of their esteem.

Mr. Nugent Fallon has resigned as superintendent of Division 5, South Boston Lines, of the Boston (Mass.) Elevated Railway to become connected with a manufacturing company in Lynn, Mass., in which he and his father are interested. Mr. Fallon was graduated from the Massachusetts Institute of Technology in 1906 with the degree of civil engineer. He immediately became a conductor with the Boston Elevated Railway and then passed through successive posts of motorman and pitman and employee in the road department, wire department, armature shop and power station. Later he worked under the storekeeper, purchasing agent and superintendent of the Grove Hall division. From three to five months were spent in each of these "cadet" assignments. For six months Mr. Fallon was assistant to the superintendent of transportation of the company. Subsequently he became chief clerk of the Charlestown division.

Mr. William Walker, who has been superintendent of the Blackstone Valley division of the Worcester (Mass.) Consolidated Street Railway for the past two years with headquarters at Uxbridge, has been appointed superintendent of the Worcester and Southbridge branch of the company, to succeed Mr. N. H. Brown, who has become connected with the Albany & Southern Railroad. Mr. Walker entered railway work in 1894 as a conductor with the Schenectady (N. Y.) Railway. He served with the company later as an inspector and continued in its employ for about ten years. He next was appointed a train dispatcher with the Berkshire Street Railway and a year later was transferred by the company to Westfield as an inspector of construction on the Western Massachusetts Street Railway. When the Western Massachusetts Street Railway was placed in operation Mr. Walker was appointed inspector of transportation. He was next transferred from Westfield to Springfield in the same capacity and was subsequently appointed superintendent of the Blackstone Valley division of the Worcester Consolidated Street Railway.

OBITUARY

William Frederick Lockwood, engineer of maintenance of way of the Interborough Rapid Transit Company, New York, N. Y., is dead. Mr. Lockwood was born in New York City on July 4, 1867, and after attending the public schools learned the trade of steamfitter. He entered the engineering department of what is now the suburban branch of the Third Avenue elevated line of the Manhattan Railway during its construction in August, 1888, and in 1891 was taken into the chief engineer's office, where he served successively as draftsman and assistant engineer until Sept. 16, 1900, when he was appointed road engineer, the duties of which office are the maintenance of the elevated and subway structures. He was appointed engineer of maintenance of way of both the elevated and subway divisions on Oct. 1, 1905. His continuous term of service covered twenty-four years. Mr. Lockwood attended Cooper Institute at night and was graduated in 1894 from the institute with the degree of bachelor of science.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Northwest Arkansas Railway, Bentonville, Ark.—Incorporated in Arkansas to build a 36-mile electric railway to connect Bentonville, Rogers, Springdale, Cave City and Pea Ridge. Headquarters, Bentonville. Capital stock, $648,000. [E. R. J., Aug. 7, '12.]

***Chattanooga & Chickamauga Interurban Railway, Rossville, Ga.**—Application for a charter has been made in Georgia by this company to build a 4-mile electric railway to extend from a point on the line between Tennessee and Georgia in or near Rossville in a southeasterly direction to the north line of Fort Oglethorpe Government Reservation. Capital stock, $50,000. Headquarters, Rossville. Incorporators: Frank Spurlock, W. H. Payne, J. L. Foust, T. G. Newman, D. S. Hahn, J. R. Anderson, Joseph Brown, W. E. Boileau, H. B. Darling and L. J. Wilhoite, all of Chattanooga, Tenn.

***Merchants' Utility Company, Indianapolis, Ind.**—Incorporated in Indiana to build electric interurban railways and to engage in the distribution of heat and light. Capital stock, $4,000,000. Directors: Edward L. McKee, C. M. Polen, Henry H. Hornbrook, Albert P. Smith, Walter S. Gloss.

Michigan City, Lakeside & St. Joe Electric Railway, Michigan City, Ind.—Application for a charter has been made by this company in Michigan to build a 30-mile electric railway from St. Joseph southwesterly to New Buffalo; thence in a southwesterly direction to the Indiana State line to connect with an extension to Michigan City. Capital stock, $750,000. Directors: G. C. Marsh, Chicago; P. C. Cramer, Chicago; Eugene Shedd, New Buffalo, Mich.; H. Bussan, New Buffalo; Otto Egloff, Chicago; J. H. MacMillan, Lagrange, Ill. [E. R. J., Aug. 3, '12.]

Middletown, Reading & Cincinnati Traction Company, Hamilton, Ohio.—Application for a charter will be made by this company in Ohio to build an electric railway from Middletown to Norwood, a distance of 35 miles. Michael Klaiber, Jr., Reading, and Joseph Brinkman, Cincinnati, are interested. [E. R. J., Aug. 24, '12.]

FRANCHISES

***Tuscaloosa, Ala.**—M. P. Jemison, vice-president of the Tuscaloosa Ice & Light Company, and Fred S. Morris, of Morris Brothers, bankers, Philadelphia, have each asked the City Commissioners for a franchise for an electric railway in Tuscaloosa, the former for an entirely new railway and the latter for conversion and extension of the Tuscaloosa Belt Line.

***Point Grey, B. C.**—The ratepayers of Point Grey have approved a franchise in favor of the British Columbia Railway.

San José, Cal.—The San José & Almaden Railway, San José, has received a franchise from the Board of Supervisors on Alameda Road, Redwood Road and McAbee Road. This 12-mile line will connect Almaden, San José and Hacienda. D. M. Burnett, Safe Deposit Building, San José, president. [E. R. J., Jan. 27, '12.]

Dubuque, Ia.—The Union Electric Company has asked the Council for a twenty-five-year franchise to build and operate a line on Thirteenth and West Locust Streets to the entrance of Mount St. Joseph College grounds in Dubuque.

Breaux Bridge, La.—The Louisiana Electric Railway & Power Company, Lafayette, has received a franchise from the Council in Breaux Bridge. This railway will connect New Iberia, St. Martinville, Breaux Bridge, Lafayette, Morrisville and Abbeville. A. G. Barrow, New Iberia, president. [E. R. J., Aug. 17, '12.]

Bourne, Mass.—The Plymouth & Sandwich Street Railway has received a franchise from the Council for a location from Sagamore to the Sandwich boundary in one direction and in another to the New Bedford & Onset Street Railway,

between Bourne and Buzzards Bay, the new route being through Bournedale and along the new highway.

St. Joseph, Mich.—The Michigan City, Lakeside & St. Joe Electric Railway, Michigan City, has asked the Council for a franchise in St. Joseph. [E. R. J., Aug. 3, '12.]

Joplin, Mo.—The Joplin & Pittsburg Railway has asked the Council for a franchise to extend its lines in Joplin from Tenth Street and Locust Street south to Cunningham Park.

Hempstead, N. Y.—The franchise asked of the Board of Supervisors of Nassau County for the right to build an electric railway from Hempstead to Baldwin and Long Beach, as recorded in the Electric Railway Journal of Sept. 21, 1912, was applied for by Edward C. Davis, Port Washington, L. I., in the interests of the Hempstead & Baldwin Traction Company.

Cleveland, Ohio.—The Cleveland Railway has received a franchise from the City Council on Highland Avenue, Cleveland, between Madison Avenue, N. W., and Detroit Avenue, N. W.

***Hamilton, Ont.**—A. M. Snyder has asked the Hamilton Board of Control for a franchise to operate an electric railway from King and Catherine Streets in Hamilton to the top of the mountain. The intention of the company for which Mr. Snyder acts is to extend a railway back to the second or third concession on the mountain top.

Tyler, Tex.—The Tyler Electric Railway has received an extension of thirty days in which to begin the construction of its line in Tyler. [E. R. J., Sept. 14, '12.]

Milwaukee, Wis.—The Milwaukee Electric Railway & Light Company will ask the Common Council for a franchise to extend its tracks on Wells Street from Eleventh Street to West Water Street in Milwaukee. This is to enable the company to operate its Wells Street cars over the new Oneida Street bridge.

TRACK AND ROADWAY

Burlingame, Cal.—Andrew M. Easton has contracted with Mahoney Brothers, San Francisco, Cal., for the construction of an electric railway from the Easton station in Easton, on the Southern Pacific Railroad, to the foothills. This is part of a plan to build a line between Burlingame and Easton. [E. R. J., Feb. 24, '12.]

Fresno (Cal.) Traction Company.—This company has placed in operation its new double-track line from Olive Avenue to Roeding Park.

Modesto & Empire Traction Company, Modesto, Cal.—During the next two months this company will award contracts to build from Modesto to Newman, a distance of 20 miles.

San Francisco-Oakland Terminal Railway, Oakland, Cal.—During the next two weeks this company will award contracts to build one double-track tunnel 700 ft. long; open cut to tunnel, 1800 ft.; solid fill to replace present trestle to ferry terminal, 200 ft. x 10,000 ft. long. The company will also build 9.4 miles of double track.

Big Four Electric Railway, Tulare, Cal.—This company has received permission from the Railroad Commissioners to sell 100,000 shares of its capital stock of the par value of $100,000 for the purpose of building an electric railway in Tulare County, 34 miles in length. The company is require to raise from stock $50,000 before beginning construction work. This line will connect Tulare, Woodville, Porterville, Visalia and Lindsay. S. A. McCoy, Visalia, chief engineer. [E. R. J., Sept. 21, '12.]

Wilmington & Southern Traction Company, New Castle, Del.—Work is well advanced on this company's extension along the Causeway and over Market Street bridge to its terminus at Front and Market Streets. The bridge being erected over the Baltimore & Ohio Railroad near the crossroads is almost completed.

Idaho Railway, Light & Power Company, Boise, Idaho.—Contracts have been placed with the Cleveland Construction Company by this company to build 5 miles of city and suburban track in Boise.

***Buhl, Idaho.**—Plans are being considered by L. B. Pearce, C. H. Taylor and E. A. Miller, Buhl, for the construction of an electric railway between Buhl, Castleford and the Salmon River.

Union Railway & Power Company, Chicago, Ill.—This company advises that it has not yet been definitely decided when construction will be begun on its line. Officers: F. Arthur Jost, president; John J. Maguire, vice-president, and Thomas Simson, Jr., secretary and treasurer, all of 161 West Quincy Street, Chicago, Ill. [E. R. J., Aug. 31, '12.]

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—The construction of an extension of its Brightwood line to Thirty-third Street in Indianapolis is being considered by this company.

Kokomo, Marion & Western Traction Company, Kokomo, Ind.—This company's line from Kokomo to Frankfort was placed in operation on Sept. 18. This line is 45 miles in length.

Creston, Winterset & Des Moines Railroad, Creston, Ia.—This company has awarded the contract for grading the right-of-way between Creston and Macksburg to J. F. Buis, E. P. Olson and T. L. Campbell, St. Joseph, Mo. [E. R. J., Sept. 7, '12.]

***Ottumwa, Ia.**—Otis T. Hare, Quincy, Ill., and associates are considering plans for the construction of electric interurban lines radiating from Ottumwa.

Ottumwa Railway & Light Company, Ottumwa, Ia.—This company will extend its lines out Court Street beyond the Ottumwa Country Club to the corner of Grand Avenue and Prairie Avenue, Ottumwa.

***Hopkinsville, Ky.**—B. H. Kennedy, president of the Owensboro Bridge & Traction Company, conferred recently with George Cox, secretary of the Owensboro Commercial Club, in regard to the plan to build an electric railway to connect Owensboro, Hopkinsville and other places in the western part of Kentucky.

Louisville & Interurban Railroad, Louisville, Ky.—This company has begun a survey for the extension of its suburban line to Orell on to West Point, a distance of 20 miles from Louisville and 6 miles from the present terminal on the Eighteenth Street road.

Bay State Street Railway, Boston, Mass.—This company will relocate and rebuild another section of its tracks through Gloucester.

Berkshire Street Railway, Pittsfield, Mass.—The State Railroad Commission on Sept. 18 gave public hearings on the petition of the Berkshire Street Railway for approval of the extension up Mount Greylock and for additional time for constructing the different extensions called for under the act of 1910.

Peekskill Lighting & Railroad Company, Peekskill, N. Y.—This company is rebuilding its line from Broad Street via Main Street to and beyond Grant Avenue, in Peekskill. Rails are being laid on concrete foundation and paved with asphalt and blocks.

Utica & Mohawk Valley Railway, Utica, N. Y.—Plans are being considered by this company for the extension of its West Dominick Street line from Expense Street to Charles Street in Rome.

Piedmont & Northern Railway, Charlotte, N. C.—This company has completed its line between Greenwood and Belton.

Laurel Park Street Railway, Hendersonville, N. C.—Plans are being made by this company to electrify its 2½-mile line in Hendersonville.

Bellefontaine & Sidney Traction Company, Bellefontaine, Ohio.—Citizens of Bellefontaine have revived interest in the proposed line to connect Sidney, Bellefontaine and Columbus. The line would connect with the Western Ohio Railway at Sidney, pass through DeGraff, Quincey, Bellefontaine, Zanesfield, West Mansfield, Peoria and Marysville and terminate at Columbus. [E. R. J., Aug. 19, '11.]

Dayton, Covington & Piqua Traction Company, West Milton, Ohio.—An extension from Covington to Bradford and thence to Loramie will be built by this company if its application to the Public Service Commission of Ohio to issue $400,000 of bonds to provide funds for this purpose is approved by the commission.

***Ludowici-Celadon Electric Railway, New Lexington, Ohio.**—This company has secured most of the right-of-way for its railway in New Lexington. The line is to be built by the Ludowici-Celadon Company, New Lexington.

Ardmore Western Interurban Railway, Ardmore, Okla.—Contracts will soon be awarded by this company to build its 100-mile electric railway to connect Springer, Glenn, Woodford, Milo, Oil City, Cornish, Orr and Brock. Officers: John Owens, president; D. E. Allen, vice-president; W. R. Burnitt, treasurer; R. A. White, secretary, and D. W. Spooner, chief engineer. [E. R. J., Sept. 14, '12.]

Bartlesville (Okla.) Interurban Railway.—Plans are being made by this company to begin at once the construction of an extension to Caney, Kan.

Oregon Electric Railway, Portland, Ore.—This company plans to extend its line further south from Eugene in the near future. Right-of-way is being obtained by the company from the intersection of East Fifth Street and High Street to the river.

Monongahela, Ellsworth & Washington Railway, Washington, Pa.—This company has awarded a contract for grading, paving and laying track on Fourth Street, Monongahela, to the Hallam Construction Company. [E. R. J., May 25, '12.]

Montreal (Que.) Tramways.—Right-of-way has recently been purchased by this company for several extensions in Montreal.

Nashville Railway & Light Company, Nashville, Tenn.—Grading has been begun by this company for the extension of its line from West End Avenue, Nashville, to Deer Park. A bridge will be built by the company about 1 mile from the end of the West End line.

Trinity Valley Traction Company, Dallas, Tex.—Surveys have been completed by this company between Dallas and Waxahachie and surveys are now being made near Austin and in the Brazos River. This line will extend from 5 to 8 miles west of the Stone & Webster line and will connect Wheatland, Desoto, Ovilla, Howard, Avalon, Frost, Hubbard City, Mart, Cameron, Temple and Taylor. It is planned to begin construction about Jan. 1, 1913. J. V. Watkins, Dallas, president. [E. R. J., April 13, '12.]

Tyler (Tex.) Street Railway.—Construction has been begun by this company on its 5-mile line in Tyler. Thomas O'Hara, Tyler, president. [E. R. J., April 13, '12.]

Virginia Railway & Power Company, Richmond, Va.—This company is extending its Halifax Street line some distance further in the direction of Butterworth bridge. The company will also extend its line at the head of Sycamore Street to connect with the viaduct crossing to the Walnut Hill Corporation suburban property.

Washington & Old Dominion Railroad, Rosslyn, Va.—This company has placed electric cars in operation on its line from the station at Thirty-sixth Street and M Street, Richmond, to Leesburg. Charles M. Henckley, 1517 H Street, N. W., Washington, president. [E. R. J., Nov. 25, '12.]

Seattle-Tacoma-Olympia Railway, Seattle, Wash.—This company advises that it expects to begin construction within sixty days on its double-track line to connect Seattle, Tacoma and Olympia. Storage battery cars will be used. Capital stock authorized, $1,500,000. Officers: W. D. Hall, president, and J. S. Wheeler, vice-president, general manager and purchasing agent, 507 New York Block, Seattle. [E. R. J., Aug. 24, '12.]

Morgantown & Wheeling Railway, Wheeling, W. Va.—Preliminary arrangements are being made by this company for the construction of its line between Elm Grove and Blacksville. The proposed new line will connect with the City & Elm Grove Railway near Monument Place, in Elm Grove, and extend south on Big Wheeling Creek Road through Patterson and thence parallel with Big Wheeling Creek to the Sand Hill district. It will pass through Ohio and Marshall Counties, thence into Green County, Pa., and through Monongalia County and back into Greene County and to the terminus at Blacksville, where the connection will be made with the Morgantown & Dunkard Valley Railroad and in this way a direct line will be established with Morgantown. F. S. Stewart, Morgantown, president. [E. R. J., June 1, '12.]

SHOPS AND BUILDINGS

Wilmington & Southern Traction Company, New Castle, Del.—Work has been begun by this company on the terminal between the Hudson Supply Company's warehouse at the southwest corner of Front and Market Streets in Wilmington.

Savannah (Ga.) Electric Company.—Bids will soon be asked by this company for the construction of a new office building on property recently purchased by this company on Whitaker Street and Bay Street in Savannah.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—Bids are being received by this company for the construction of a new freight depot at Logansport. The structure will be 31 ft. x 100 ft., one story high and of brick construction.

Laurel Electric Power & Light Company, Laurel, Miss.—This company has completed its new carhouse in Kingston.

United Railways, St. Louis, Mo.—This company plans to build a new carhouse in St. Louis.

Rochester, Syracuse & Eastern Railroad, Syracuse, N. Y.—Land has been purchased by this company in Newark as a site for a new passenger station.

Laurel Park Street Railway, Hendersonville, N. C.—This company will build its new repair shops and carhouse at the Transylvania Railroad crossing in Hendersonville.

Northern Ohio Traction & Light Company, Akron, Ohio.—The new terminal station to be erected on North Main Street, Akron, by this company will be six stories in height on Main Street and four stories on High Street. The plans have been completed, and it is stated that work will be started next spring.

Ohio Electric Railway, Cincinnati, Ohio.—A new passenger station will soon be built by this company in Deshler.

Portland Railway, Light & Power Company, Portland, Ore.—During the next few weeks this company will award contracts to build a new brick and concrete storeroom and warehouse near the company's new repair shops in Portland.

Dallas Consolidated Electric Street Railway, Dallas, Tex.—This company plans to build soon a new carhouse on Elm Street, Dallas.

POWER HOUSES AND SUBSTATIONS

British Columbia Electric Railway, Vancouver, B. C.—This company will build a two-story concrete substation on Main Street in Vancouver to cost $40,000.

Oakland, Antioch & Eastern Railroad, San Francisco, Cal.—This company has ordered from the Westinghouse Electric & Manufacturing Company two 750-kw, 1300-volt d.c., 1080-hp, 11,000-volt a.c., three-phase, 60-cycle, 514-r.p.m., two-bearing synchronous motor-generator sets, together with two five panel switchboards for the control of same.

Union Traction Company, Coffeyville, Kan.—This company is installing additional equipment in its substation just west of Coffeyville.

Aroostook Valley Railroad, Presque Isle, Maine.—During the next few weeks this company will award contracts to build a new substation at Caribou. The company has purchased two 200-kw, 600-volt, 60-cycle General Electric rotary converters.

Rochester Railway & Light Company, Rochester, N. Y.—This company has ordered from the Westinghouse Electric & Manufacturing Company two three-unit, four-bearing motor-generator sets consisting of one 145-kw, 120-volt d.c. generator, also one 45-kw, 80-volt d.c. generator, driven by one 285-hp, 4150-volt, three-phase, 60-cycle, 900-r.p.m. synchronous motor.

Northern Ohio Traction & Light Company, Akron, Ohio.—Work on the substation adjoining the site of this company's terminal is being pushed rapidly, so that it may be used in connection with the new power house at Cuyahoga Falls, now nearing completion. When it is put into operation the old Beach Street power house will be sold.

Manufactures and Supplies

ROLLING STOCK

Idaho Railway, Light & Power Company, Boise, Idaho, is in the market for one snow plow.

Lancaster Traction & Power Company, Lancaster, Ohio, has ordered one car from the Cincinnati Car Company.

Indiana, Columbus & Eastern Traction Company, Cincinnati, Ohio, has ordered fifty cars from the Cincinnati Car Company.

Washington, Baltimore & Annapolis Electric Railway, Baltimore, Md., is said to be figuring on the purchase of two express cars.

Laurel Park Street Railway, Hendersonville, N. C., is reported to be in the market for several second-hand cars. W. A. Smith, president.

Brooklyn (N. Y.) Rapid Transit Company has ordered two Russell snow sweepers from the Russell Car & Snow Plow Company through Wendell & MacDuffie, New York.

Tacoma Railway & Power Company, Tacoma, Wash., is in the market for six cars complete and four car bodies. They are to be closed, double-end, straight-sided cars with clamshell, detachable hoods, closed vestibules and open bulkheads. The general dimensions and other details of these cars are as follows:

Seating capacity	52	Air brakes	straight air
Length of body	34 ft. 5 in.	Control	K-35-G
Length over vestibule,	46 ft. 5 in.	Fenders	drop
		Gongs	rotary
Width over sills	8 ft. 3½ in.	Motors,	
Width over all	8 ft. 4 in.		50-hp interpole, outside-hung
Body	semi-steel	Seats	long. and cross
Roof	arched	Wheels	33-in. cast iron

TRADE NOTES

American Shop Equipment Company, Chicago, Ill., has elected W. O. Jacquette its vice-president, with headquarters at 30 Church Street, New York.

Pfannmueller Engineering Company, Chicago, Ill., on Oct. 1, 1912, will move its general offices from the machine shop and warehouse to 1733 First National Bank Building, Chicago.

Pratt & Whitney Company, New York, N. Y., has opened an office and salesroom for small tools and gages at 336 West Fourth Street, Cincinnati, Ohio, to be in charge of C. M. Pond.

Canadian Car & Foundry Company, Montreal, Que., has issued $500,000 additional 6 per cent first mortgage bonds, and these have been purchased by the Royal Securities Corporation and Lee, Higginson & Company, Boston.

C. S. Price has resigned as president of the Cambria Steel Company, Johnstown, Pa. Mr. Price has been ill for several months. He has been president of the Cambria Steel Company since March, 1910, and previous to that time he was for years vice-president and general manager of the company.

Kerr Turbine Company, Wellsville, N. Y., has opened an office in 2137 Oliver Building, Pittsburgh, Pa., in charge of R. M. Rush, formerly connected with the Dravo-Doyle Company. F. B. Allen, formerly with the Cleveland office of the Cooper-Hewitt Company, will be associated with Mr. Rush.

Western Electric Company, New York, N. Y., has received an order from the Portland (Ore.) Railway, Light & Power Company for apparatus to be used in equipping its interurban lines with telephone train-dispatching equipment. One division to be equipped extends from Portland to Cazadero, Ore., a distance of 40 miles, while the other is the Mount Hood division, extending from Portland to Bull Run, a distance of 30 miles. The dispatcher will be located at Portland. Seventeen way stations in all will be equipped with No. 102-A selector sets, containing the standard Western Electric No. 50 type selector. The circuits, however, are so arranged that an ultimate of thirty-six stations can be equipped with selector apparatus. The Western Electric Company has also received an order from the Central of Georgia Railway for the necessary apparatus for making the third installation of telephone train-dispatching equipment within the year.

Strauss Bascule Bridge Company, Chicago, Ill., announces its appointment as designing engineer during the past two months for the following structures: A 65-ft. single-leaf Strauss bascule bridge (overhead counterweight type) across Newton Creek at Broadway, Camden, N. J.; an 82-ft. double-leaf Strauss bascule bridge (underneath counterweight type) across Black River at Military Street, Port Huron, Mich.; a 588-ft. single-leaf Strauss bascule bridge (overhead counterweight type) across the Elizabeth River at South Street, Elizabeth, N. J.; two 175-ft. single-leaf, four-track Strauss bascule bridges over Bronx Kills for the New York Connecting Railroad, these bridges to be built as stationary spans with provision for conversion into bascules (underneath counterweight type) later; a combined railway and highway bridge, 3000 ft. long, across the Arkansas River at Pine Bluff, Ark., comprising one 245-ft. Strauss direct-lift span, five 245-ft. stationary spans, any one of which can be converted into a lift span if desired, one 140-ft. fixed span and 1390 ft. of trestle approaches.

ADVERTISING LITERATURE

Power Specialty Company, New York, N. Y., has issued a 32-page catalog which illustrates and fully describes Foster superheaters and superheated steam specialties.

C-A-Wood-Preserver Company, St. Louis, Mo., is mailing a circular which calls attention to a recent order for C-A-Wood-Preserver received from the Signal Service of the War Department.

The J. G. Brill Company, Philadelphia, Pa., has issued Catalog No. 201, which is an order guide for Brill car parts and specialties. Each part is listed, illustrated and accompanied by an order number. The catalog contains 200 pages and is bound in cloth.

Bryant Electric Company and Perkins Electric Switch Manufacturing Company, Bridgeport, Conn., have issued their 1912 catalog, which describes and illustrates their complete line of wiring devices. The catalog lists more than 300 devices which have been brought out since the 1910 catalog was published.

General Electric Company, Schenectady, N. Y., has issued two bulletins, one illustrating and describing alternating-current switchboard panels for three-phase, three-wire circuits of 240, 480 and 600 volts, 25 to 60 cycles, and the other describing direct-current switchboards, double polarity, 125, 250 and 600 volts.

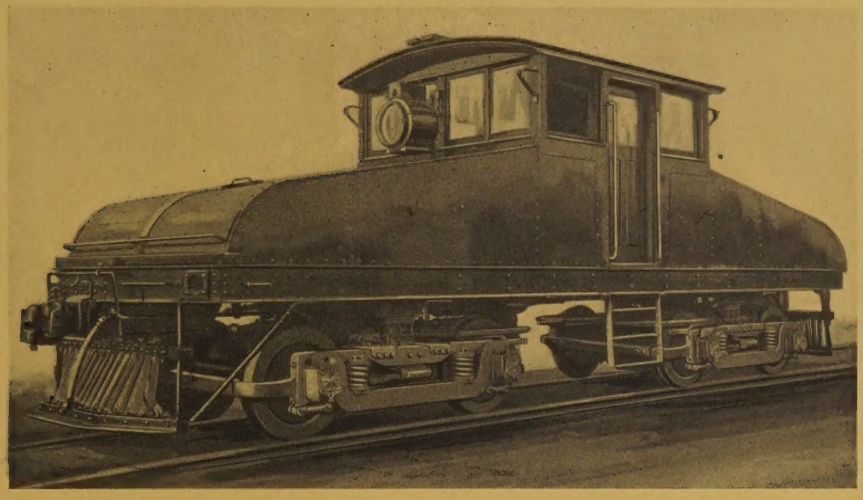
Lagonda Manufacturing Company, Springfield, Ohio, has issued Bulletin R1, entitled "Lagonda Strainers." The catalog first points out why a strainer is necessary and how much power is lost in plants owing to decreasing the vacuum by restricting the flow of condenser circulating water. The various sizes and types of strainers are illustrated. The points of superiority of this strainer are also taken up and photogaphs are included showing how these strainers may be buried under the floors of boiler rooms with only the hand wheel projecting above the surface, thus not reducing the available floor space, while at the same time the strainer can be readily cleaned.

NEW PUBLICATION

Manual of Statistics. Manual of Statistics Company, New York. Cloth, 1098 pages. Price, $5.

This is the thirty-fourth annual issue of this useful publication. It gives in condensed form the principal statistics that are desired by investors in railroad and industrial securities. In addition there is detailed information in reference to government securities and prices covering a range of three years for the principal securities listed on the leading stock exchanges of this country and Canada. Other information relates to mining stocks, statistics of cotton production and prices, prices of grain and provisions, rates for time and call loans, bank clearings, tables of income-yielding capacity of securities and rates of dividends and quotations for the stocks of leading railway and industrial companies in the country.

BRILL CITY AND INTERURBAN CARS AND TRUCKS BRILL



Heavy Electric Locomotives

The locomotive shown is of the design adopted by a number of the largest interurban systems, on account of the unobstructed view in every direction which the operator has from the centrally located cab and the ample space provided for loading the car to obtain the necessary traction for heavy trains. It is built on an all-steel frame, and the sides and covers at both ends are steel. The rapidly increasing number of interurban lines connecting with steam roads for the handling of freight traffic is making a considerable demand for locomotives fitted with steam car couplers and powerful enough to switch and draw a train of freight cars. The above locomotive is mounted on Brill No. 27 MCB3 trucks, which are capable of a speed of 65 miles per hour and a load on center plates of 88,000 lbs.

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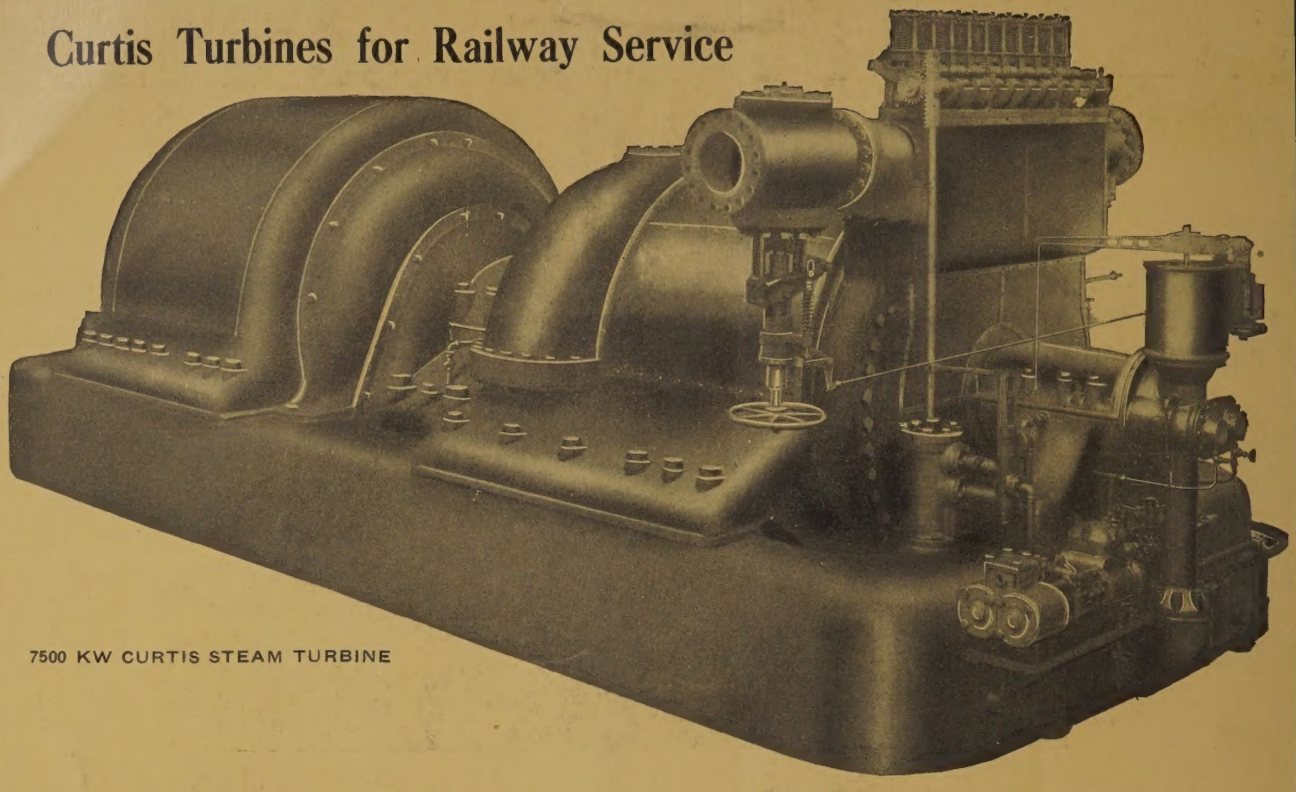
Curtis Turbines for Railway Service



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2. **Curtis Turbines,** due to their rugged internal construction, safely withstand the severe demands of rapidly fluctuating loads.

3. **Curtis Turbines** derive the maximum advantage from high steam pressure and high vacuum.

4. **Curtis Turbines,** due to ample running clearances, are not subject to the danger of contact between moving and stationary parts.

5. **Curtis Turbines** are constructed to withstand sudden changes of temperature, incident to quick starting, or to variations in superheat while running.

6. **Curtis Turbines** drive generators designed and built by the largest electrical manufacturer in the world, based on years of experience with all classes of electrical apparatus.

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